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EDITORIAL.

Progress of the Oil Palm Industry.

The oil palm industry has made rapid strides during the past decade; the planted area has increased from 8,000 acres to 75,000 acres, the exports from 2,000 tons to 70,000 tons, and the value of exports from $500,000 to $6,500,000. As a considerable area has not reached the bearing stage and other areas are not yet in full bearing, further expansion of exports may be expected for some years to come.

Early development of the industry was encouraged by the very favourable prices then ruling for its products; during recent years, however, producers have been faced by persistent low prices for both palm oil and palm kernels, and only by the very closest attention to economy on the estate and efficient selling organization has the industry been able to weather the storm.

The continued attention given to research has been of considerable assistance in the establishment of the industry. Selection of seed, planting methods and factory procedure claimed early attention and the experimental work carried out on these problems has long since been translated into estate practice. While the solution of the complex problems concerning manuring has not yet reached finality, progress has been sufficient to enable producers to lay down a manurial programme which is acknowledged to be effective and economic.

In the pages of this Journal we have published annually a report on the progress of manurial experiments, and in the present number is included an account of the progress of this investigation in 1938 and 1939. The results to-date tend to confirm those of previous years, upon which the programme of manuring has been based by most producers. In the absence of proof to the contrary, the author advocates a continuation of phosphatic manuring on both quartzite and peat soils carrying mature palms which are yielding not more than 1,500 lbs. of oil per acre per annum. Information concerning manuring on the Raub Series soils, coastal clays and granite soils is not yet available.

These manurial experiments have been carried out at the Central Experiment Station, Serdang, and on a number of estates. The co-operation of the managers of these estates has been most helpful and the Department takes this opportunity of acknowledging the very valuable assistance they have given towards the solving of

manurial problems. The benefit of the results of experimental work are shared by all estates and it is therefore hoped that all estates will contribute their knowledge to the common good; this they can do by close co-operation with the research work of the Department of Agriculture.

Malayan Agricultural Trade.

We publish in this issue our annual review of the agricultural trade of Malaya. From an agricultural point of view the prosperity of this country depends in great measure, of course, upon the rubber industry, but it is instructive to consider the value of agriculture to Malaya excluding this crop of major importance. The review accordingly includes tables which show clearly all aspects of our agricultural trade, and it will be seen that this trade, excluding rubber, has exceeded 200 million dollars for several years.

The value of Malaya's agricultural entrepôt trade may not be fully appreciated, and a table in the review illustrates clearly the extent of this trade. Imports of agricultural products for re-grading and conditioning for world markets exceeded 130 million dollars during 1939.

In viewing agricultural values from the standpoint of imports and exports, the value of Malayan production of crops to satisfy local demand is apt to be overlooked. Thus for example, our record rice crop in the 1938-39 season was estimated to be worth nearly 21 million dollars to Malaya. Apart from the large exports of coconut oil and copra, it is estimated that the annual local consumption of fresh nuts and coconut oil is in the neighbourhood of 80,000 tons copra equivalent, while local consumption of copra cake, used as a feeding stuff for animals, is approximately 30,000 tons. Increasing quantities of Malayan-grown tea are consumed locally, while local production of vegetables and fruits is very considerable. Thus, the contribution of agriculture to Malaya's economy is infinitely more important than is indicated by trade returns.

Original Articles.

MANURIAL EXPERIMENTS ON OIL PALMS

BY

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Introductory.

Accounts have been published in previous numbers of this Journal ([1], [2] & [3]) of the lay-out, treatment and yields of manurial experiments on oil palms carried out on certain estates and at the Central Experiment Station, Serdang. The last account, published in July, 1938, dealt with the experiments on Estate A, Estate C and Field 5D, Serdang, and reviewed the records up to December, 1937.

The present article reviews the results of these three experiments up to the end of December, 1939. In addition, the opportunity has been taken to present a review of the position which has now been reached in regard to certain other manurial experiments on oil palms in Malaya.

In preparing this article a number of errors, some serious, were discovered in the tables and graphs which accompanied the preceding article (July, 1938). These have now been corrected.

In view of the various changes which have been made in the manurial treatments and the intervals which have in cases occurred between the application of fertilizers to the experimental areas on Estate A, Field 5D, Serdang, and Estate C, new tables have been drawn up which facilitate the presentation of the data involved.

Estate A.

The experimental area is on hill quartzite soil, planted in 1922. The experiment was laid down in 1929, preliminary yields being recorded from then until July, 1930, when manures were first applied. The lay-out is 2 blocks of 12 plots each, 10 palms per plot; four treatments are randomized in triplicate within each block.

Frequent changes have been made in the types and quantities of manures applied. These can be seen by a reference to Table I which shows for each type of plot the nature, quantity and time of application of fertilizers. The quantity in lbs. per palm is shown in the second half of each column and the basic chemical element, nitrogen, phospate or potash, is referred to by the letter N, P or K in the first half of the column. The sub-numerals attached to the letters show the exact manure applied by reference to the key at the foot of the table.

Yield figures are given in Tables II, III and IV and are shown in Graph 1.

From an examination of the results up to December, 1934, it was concluded that the manurial treatments had given significant increases over the control and that phosphatic manure alone (superphosphate or basic slag) was as efficient as the more expensive mixtures. The lag which occurred between the application of manures and the effect on yield was shown to be about 18 months. Manuring was discontinued after July, 1932, in order to see how long the effects of the previous applications would continue.

Table I.

Estate A. Palms Planted 1922.

Record of Manures Applied.

Year	Treatment 1		Treatment 2		Treatment 3		Treatment 4	
	Manure	Quantity	Manure	Quantity	Manure	Quantity	Manure	Quantity
		lbs.		lbs.		lbs.		lbs.
1930 July	$N_1P_1K_1$	1.3.1	P_1K_1	3.1	P_1	3	—	—
1931 January	$N_1P_1K_1$	1.3.1	P_1K_1	3.1	P_1	3	—	—
July	$N_1P_1K_1$	1.3.1	P_1K_1	3.1	P_1	3	—	—
1932 January	$N_1P_2K_1$	1.3.1	P_2K_1	3.1	P_2	3	—	—
July	$N_1P_2K_1$	1.3.1	P_2K_1	3.1	P_2	3	—	—
1933	—	—	—	—	—	—	—	—
1934	—	—	—	—	—	—	—	—
1935 July	P_3	4	P_3	4	P_3	4	P_3	4
1936	—	—	—	—	—	—	—	—
1937	—	—	—	—	—	—	—	—
1938 July	$N_2P_3K_3$	1.2.1	P_3K_3	2.1	N_2P_3	1.2	P_3	2
1939 January	$N_2P_3K_3$	1.2.1	P_3K_3	2.1	N_2P_3	1.2	P_3	2
July	$N_2P_3K_2$	2.4.6	P_3K_2	4.6	N_2P_3	2.4	P_3	4

Key.

N_1 = ammonium sulphate
N_2 = calcium cyanamide

K_1 = potassium sulphate
K_2 = patent kali (containing 16% MgO)*
K_3 = kainit

P_1 = superphosphate
P_2 = basic slag
P_3 = rock phosphate
P_4 = Christmas Island dust

Notes :—

(1) Magnesium was included in the mixture applied to half plots from 1930 to 1932.
(2) The patent kali applied in 1939 was put on in March.

By the end of 1935, $3\frac{1}{2}$ years after the last of the earlier manurial applications, yields of all the plots had fallen sharply and the treated plots were yielding about the same as the control plots. This indicated that after 3 to $3\frac{1}{2}$ years all effects of the manures had worn off.

In July, 1935, a single dressing of rock phosphate was applied to all plots including the controls. Following this the yields in 1936 showed a slight upward swing, but by the end of 1937 it was concluded that there had been no real response to these dressings.

* Patent kali is a proprietary fertilizer containing both potassium and magnesium.

MANURIAL EXPERIMENT ON OIL PALMS.

PLANTED 1922.

ESTATE A.

HILL QUARTZITE SOIL.

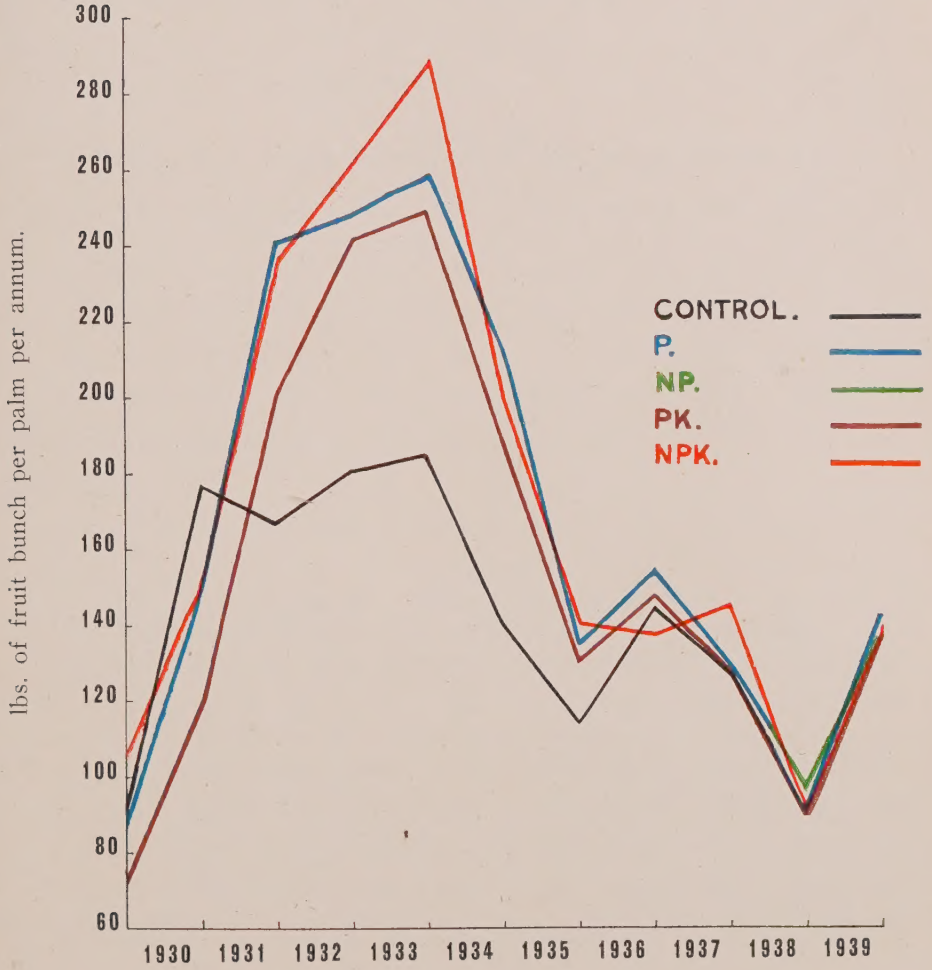

Table II.
Estate A. Mean Weight of Fruit Bunch per Palm per Annum.
(lbs)

Treatment No.	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
1 ...	101	148(1)	234(1)	259(1)	286	198	138(4)	135	143	88(1)	138(1)
2 ...	71	118(2)	199(2)	240(2)	247	187	129(4)	146	126	88(2)	136(2)
3 ...	86	148(4)	240(4)	246(4)	257	209	134(4)	154	128	96(3)	136(3)
4 ...	90	177	167	181	185	141	114(4)	145	127	90(4)	142(4)

(1) Indicates manured during the year with NPK mixture.
(2) " " " " " " PK "
(3) " " " " " " NP "
(4) " " " " " " P

For details see Table I.

Table III.
Estate A. Yields Expressed as Percentage of Controls.

Treatment No.	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
1 ...	112	84(1)	140(1)	143(1)	155	140	121(4)	93	113	98(1)	97(1)
2 ...	79	67(2)	119(2)	133(2)	133	133	113(4)	101	99	98(2)	96(2)
3 ...	96	84(4)	144(4)	136(4)	139	148	117(4)	106	101	107(3)	96(3)
4 ...	100	100	100	100	100	100	100(4)	100	100	100(4)	100(4)

(1) Indicates manured during the year with NPK mixture.
(2) " " " " " " PK "
(3) " " " " " " NP "
(4) " " " " " " P

For details see Table I.

Table IV.
Estate A. Palms Planted 1922.
Calculated Yields in lbs. of Oil per Acre per Annum.
(Table I recalculated on the basis of 55 palms per acre and 16 per cent. oil on bunch weight.)

Treatment No.	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
1 ...	890	1300(1)	2080(1)	2280(1)	2520	1740	1215(4)	1190	1260	775(1)	1215(1)
2 ...	625	1030(2)	1750(2)	2110(2)	2180	1650	1135(4)	1285	1110	775(2)	1200(2)
3 ...	760	1300(4)	2110(4)	2160(4)	2260	1840	1180(4)	1355	1125	845(3)	1200(3)
4 ...	790	1560	1470	1590	1630	1240	1000(4)	1275	1120	790(4)	1250(4)

(1) Indicates manured during the year with NPK mixture.
(2) " " " " " " PK "
(3) " " " " " " NP "
(4) " " " " " " P

For details see Table I.

At this time three possible explanations were put forward to explain this lack of response:

(i) That the general health of the palms had deteriorated to such an extent following three years without fertilizer that a single application of phosphate was insufficient.

(ii) That the palms had reached the stage at which phosphate alone was insufficient and a more complex manurial treatment was needed.

(iii) That palms on hill quartzite soil deteriorate at about 14 years from planting.

To test these possibilities fresh manurial treatments were applied in July, 1938, and have been continued since then at six-monthly intervals: it should be noted that all plots are now receiving at least a phosphate dressing.

During 1938 yields dropped further but it was clearly too soon to expect any response to the dressings applied in the middle of the year; an upward swing was anticipated during 1939.

This upward swing in fact occurred, and all treatments at the end of the year were giving practically identical yields.

It would seem at the moment, therefore, that the continued application of phosphate has suceeded in raising yields again, though as yet not to a very high level. The experiment must be continued in order to see in the first place if this is in fact the case, and should it be so, if, over an extended period, nitrogen and potash will have any additional effect.

As the position at present stands, if the upward swing proves to be a real response to manuring, explanations (ii) and (iii) above fail; if on the other hand yields drop again in 1940, it will lend colour to the view that the useful life of palms on this type of soil is limited to about 15 years. Even, however, if this drop occurs in 1940 it would be unwise to accept the latter conclusion too readily: at least two further seasons' yields would have to be recorded to confirm the lack of response to manuring, and in addition the possibility would have to be considered of some factor as yet unrecognized which was limiting the growth of the palms.

Table V shows the mean number of bunches per palm produced by palms of each treatment, and Table VI, which is derived by dividing the figures in Table II by the corresponding ones in Table V, gives the average weight of bunches.

The manuring carried out over the period 1930 to 1932 appeared to increase the number of bunches but the peak crop which occurred in 1933 did not correspond with either greatest bunch production per palm or maximum average weight of bunch.

There seems to be a general tendency for the bunches to become fewer but heavier from 10 years onwards.

Table V.

Estate A. Mean Number of Bunches per Palm.

Treatment No.	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
1 ...	5.8	6.1(1)	8.9(1)	9.2(1)	8.8	5.9	4.0(4)	4.0	4.5	3.0(1)	4.1(1)
2 ...	4.6	5.8(2)	8.9(2)	9.1(2)	8.3	6.2	4.5(4)	4.8	4.5	3.5(2)	4.6(2)
3 ...	4.9	7.9(4)	10.6(4)	9.7(4)	8.7	7.2	4.5(4)	5.2	4.7	3.7(3)	4.7(3)
4 ...	5.6	7.4	7.6	7.9	6.9	5.1	3.9(4)	5.0	4.6	3.3(4)	4.9(4)

(1) Indicates manured during the year with NPK mixture.
(2) " " " " " " PK "
(3) " " " " " " NP "
(4) " " " " " " P

For details see Table I.

Table VI.

Estate A. Average Bunch Weight.

(lbs)

Treatment No.	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
1 ...	17.4	24.3(1)	26.3(1)	28.2(1)	32.6	33.7	34.5(4)	33.8	31.8	29.3(1)	33.7(1)
2 ...	16.7	20.4(2)	22.3(2)	26.4(2)	29.8	30.1	28.7(4)	30.4	28.0	25.1(2)	29.6(2)
3 ...	17.6	18.7(4)	22.6(4)	25.4(4)	28.9	29.3	29.8(4)	29.6	27.3	25.9(3)	28.9(3)
4 ...	16.2	23.9	21.9	23.9	27.0	27.6	29.2(4)	29.0	27.6	27.3(4)	28.9(4)

(1) Indicates manured during the year with NPK mixture.
(2) " " " " " " PK "
(3) " " " " " " NP "
(4) " " " " " " P

For details see Table I.

Field 5D, Serdang.

The experimental area is on hill quartzite soil, planted in 1922, similar in these respects to Estate A. The experiment was laid down in July, 1932, when manures were first applied. The lay-out is 5 blocks of 5 plots each, 30 palms per plot; within each block each treatment is randomized once.

The types and quantities of manures applied are shown in Table VII in a similar manner to Table I.

Table VII.

Field 5D Serdang. Palms Planted 1922.

Record of Manures Applied.

Year.	NPK		NP		PK		P		Control.	
	Manure	Quantity	Manure	Quantity	Manure	Quantity	Manure	Quantity	Manure	Quantity
		lbs.		lbs.		lbs.		lbs.		lbs.
1932	$N_2P_3K_3$	2.6.2	N_2P_3	2.6	P_3	6	P_2	6	—	—
1933	—		—		—		—		—	
1934	—		—		—		—		—	
1935	$N_2P_3K_3$	2.4.3	P_3	4	P_3	4	P_4	4	—	
1936	P_3	4	—		P_3	4	P_4	4	—	
1937	$N_2P_3K_3$	2.4.3	N_2P_3	2.4	P_3	4	P_4	4	—	
1938	$N_2P_3K_3$	2.4.3	N_2P_3	2.4	P_3K_3	4.3	P_3	4	—	
1939	$N_2P_3K_2$	2.4.6	N_2P_3	2.4	P_3K_2	4.6	P_3	4	—	

Key:
N_2 = calcium cyanamide
K_2 = patent kali (containing 16% MgO).
K_3 = kainit
P_2 = basic slag.
P_3 = rock phosphate.
P_4 = Christmas Island dust.

Notes:
(1) All manures applied during July of the year.
(2) In addition to the above manures bunch refuse at the rate of ¾ cwt. per palm was applied to half of every plot in 1938.

Yield figures are given in Tables VIII, IX and X and are shown in Graph 2.

The first and single application of fertilizers in July, 1932, appeared to improve the yields during 1933, that is up to 18 months after application, after which yields fell steadily during 1934 and 1935. It seemed, therefore, as in the case of Estate A that there was little or no difference in response to phosphatic manuring, that phosphate alone was sufficient, and that the duration of benefit from fertilizers applied did not exceed 2 years.

To test whether, as the palms grew older, a complete mixture was necessary a fresh manurial programme was introduced in 1935. By the end of 1936 yields had risen considerably all round, but the appearance of bronzing and wilting in the experimental area led to a modified programme being introduced in 1937. Probably in measure due to this incidence of wilting all-round drops in yield occurred in 1937 and 1938 but all plots including the controls improved considerably in 1939.

As an additional treatment, bunch refuse at the rate of ¾ cwt. per palm was applied to half plots in 1938. No results of this treatment are yet apparent.

MANURIAL EXPERIMENT ON OIL PALMS.

PLANTED 1922.

BLOCK 5 D SERDANG.

HILL QUARTZITE SOIL.

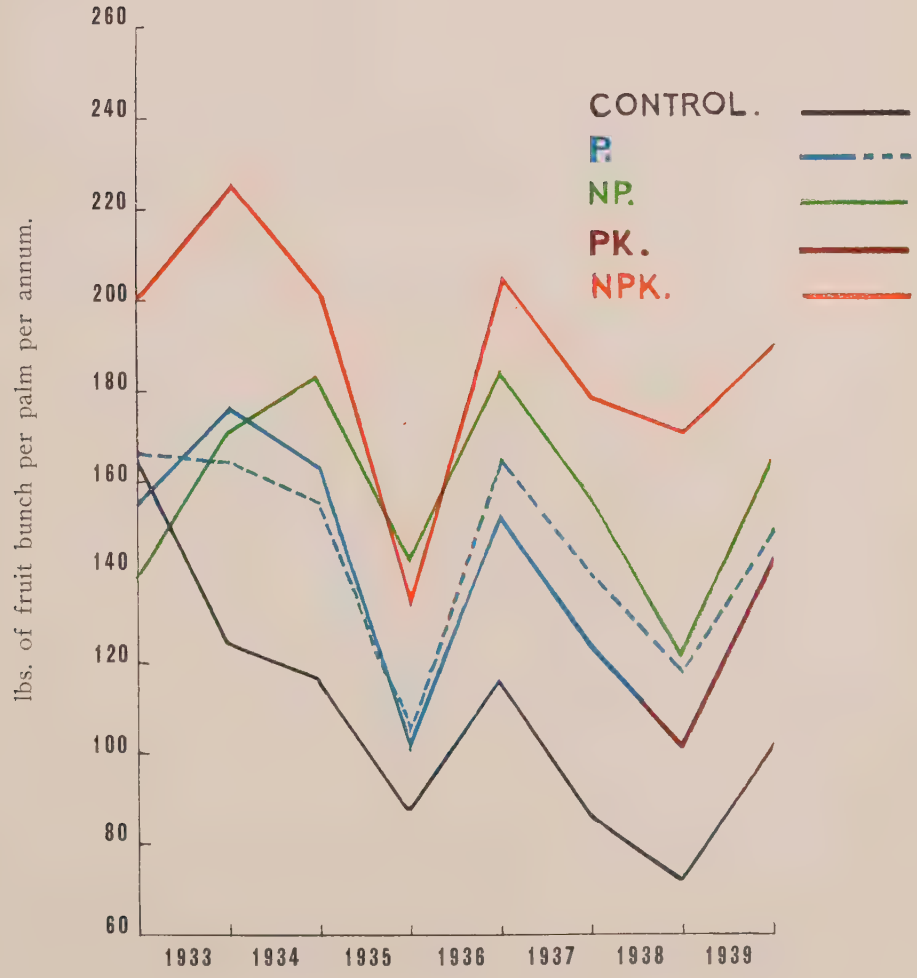

Table VIII.

Field 5D Serdang.

Mean Weight of Fruit Bunch per Palm per Annum.

(lbs.)

Treatment.	1932* Calculated.	1933	1934	1935*	1936*	1937*	1938*	1939*
NPK ...	201	225	201	133	204(a)	178	171	190
NP ...	138	170	182	142(a)	183(b)	156	121	164
PK ...	155(a)	176	163	101(a)	152(a)	124(a)	102	143
P ...	166	164	155	105	164	139	118	149
Control ...	163	124	116	87	116	86	72	102

* manurial dressing applied during this year.

(a) phosphate only applied.

(b) manurial dressing withheld.

For details see Table VII.

Table IX.

Field 5D Serdang.

Yields Expressed as Percentage of Controls.

Treatment.	1932* Calculated.	1933	1934	1935*	1936*	1937*	1938*	1939*
NPK ...	123	181	173	153	176(a)	207	238	186
NP ...	85	137	157	163(a)	158(b)	181	168	161
PK ...	95(a)	142	141	116(a)	131(a)	144(a)	142	140
P ...	102	132	134	121	141	161	164	146
Control ...	100	100	100	100	100	100	100	100

* manurial dressing applied during this year.

(a) phosphate only applied.

(b) manurial dressing withheld.

For details see Table VII.

Table X.

Field 5D Serdang. Palms Planted 1922.

Calculated Yields in lbs. of Oil per Acre per Annum.

(Table VII recalculated on the basis of 55 palms per acre and 16 per cent. oil on bunch weight.)

Treatment.	1932* Calculated.	1933	1934	1935*	1936*	1937*	1938*	1939*
NPK ...	1770	1980	1770	1170	1795(a)	1565	1505	1670
NP ...	1215	1495	1600	1250(a)	1610(b)	1370	1065	1445
PK ...	1365(a)	1550	1435	890(a)	1340(a)	1090(a)	895	1260
P ...	1460	1445	1365	925	1445	1225	1040	1310
Control ...	1435	1090	1020	765	1020	755	635	895

* manurial dressing applied during this year.
(a) phosphate only applied.
(b) manurial dressing withheld.

For details see Table VII.

The behaviour of the control plots since 1934 has been in step with the behaviour of the manured plots and it would seem that seasonal fluctuations are liable to be large. At the end of 1939 it may be said that the P, PK and NP have improved considerably over the control plots, which have in the main shown a decrease in yield. The influence of the NPK dressing is difficult to assess, as unfortunately these plots were yielding at a higher level at the beginning of the experiment. Their seasonal behaviour, however, has been in step with the others.

The behaviour of the NP plots is interesting: these started by being the lowest yielders, but, having improved considerably after their initial dressing, they have maintained their position as second best.

Briefly, therefore, up to the present this experiment has supplied little information beyond the fact that continued phosphate dressing seems necessary, and a suggestion that nitrogen in addition may have beneficial effects. It is hoped that further information may emerge in the course of the next two or three seasons, particularly in regard to the question of additional nitrogen and potash.

Table XI shows the mean number of bunches per palm produced by palms of each treatment, and Table XII gives the average weight of bunches in lbs. A study of the figures for the control plots in Table XI indicates that there is a large seasonal fluctuation in the number of bunches produced by a palm. Manuring appears to increase the numbers produced as well as the average weight of the bunches.

Table XI.

Field 5D Serdang. Mean Number of Bunches per Palm.

Treatment.	July-Dec. 1932*	1933	1934	1935*	1936*	1937*	1938*	1939*
NPK ...	5.4	10.3	8.6	6.4	9.3(a)	7.8	7.5	7.9
NP ...	4.1	9.1	9.3	7.5(a)	9.6(b)	7.6	6.1	7.8
PK ...	4.7(a)	9.7	8.7	5.8(a)	8.5(a)	6.8(a)	5.6	7.1
P ...	4.5	8.7	8.5	6.1	9.7	7.7	6.7	8.1
Control ...	4.9	7.7	6.8	5.1	7.5	5.4	4.7	6.1

* manurial dressing applied during this year.
(a) phosphate only applied.
(b) manurial dressing withheld.

For details see Table VII.

Table XII.

Field 5D Serdang. Average Bunch Weight.

(lbs).

Treatment.	July-Dec. 1932*	1933	1934	1935*	1936*	1937*	1938*	1939*
NPK ...	17.9	21.9	23.4	20.8	21.9(a)	22.8	22.8	24.1
NP ...	15.9	18.7	19.6	18.9(a)	19.1(b)	20.5	19.8	21.0
PK ...	14.4(a)	18.1	18.7	17.4(a)	17.9(a)	18.2(a)	18.2	20.1
P ...	15.0	18.9	18.2	17.2	16.9	18.1	17.6	18.4
Control ...	13.7	16.1	17.1	17.0	15.5	15.9	15.3	16.7

* manurial dressing applied during this year.
(a) phosphate only applied.
(b) manurial dressing withheld.

For details see Table VII.

In the article in this Journal in July, 1939, ([3]) it was stated that "there has been a falling off in yield on Block 5D after the cessation of manuring, but whereas in the case of Estate A there has been chiefly a decrease in the number of bunches, on 5D in 1936 there was a fall in the weight of bunches rather than in numbers." This statement was made from a study of Tables VII and VIII in the article referred

to. Unfortunately owing to errors in calculation the statement is incorrect. Table XII in the present article shows that the average weight of bunches rose progressively in 1936 and 1937 and that in the case of the manured plots the level reached has been maintained.

Estate C.

Whereas the experiments described on Estate A and Field 5D, Serdang, were laid out on palms already 8 to 10 years old, the experiment on Estate C was designed to afford information on the manuring of young oil palms.

The experimental area is on gently sloping land on hill quartzite soil, planted in December, 1929. Preliminary observations on height of palms and spread of foliage showed satisfactory uniformity of vegetative growth. The lay-out is 6 blocks of 5 plots each, 8 palms per plot; five treatments are randomized within each block.

Manures were first applied in July, 1932, $2\frac{1}{2}$ years after planting, and thereafter half-yearly until February, 1934. The first fruit bunches were harvested in November, 1932, approximately 3 years from planting.

The types and quantities of manures applied to date are shown in Table XIII in a similar manner to Table I.

Yield figures are given in Tables XIV, XV and XVI, and are shown in Graph 3.

The rise from 1933 to 1935 is apparently due to the palms coming into bearing, since it is shown practically to the same extent by the control plots. The increases shown in 1936 by the NPK and PK plots were, however, statistically significant. As in the case of Estate A and Field 5D the cessation of manuring in 1935 was followed by a sharp drop in yields by 1938. The lag period seems to be a little longer in the case of these palms but the higher-yielding plots, NPK and NP, were showing signs of this drop within 2 years.

Manuring was commenced again in July, 1938, but up to the end of 1939 this appears to have done little more than check, in the main, the downward swing of yields. It is expected that the effect of this manuring will commence to show in the yield figures for 1940.

One or two interesting points arise from a study of Graph 3. In the first place it will be observed that the yield figures are considerably higher than those for Estate A and Field 5D, older palms on similar soil. This may well be due to the higher content of available nutrients in the soil during the first few years after planting. If it be assumed that nitrogen and phosphate deficiencies in the soil begin to appear within 5 or 6 years of planting, this would explain the significant increases given in 1936 by the NPK and NP treatments. If the double deficiency exists then neither nitrogen alone nor phosphate alone would increase yields.

The steady drop of the control plots since 1937 may indicate that the yields are now about to sink steadily on these plots to a figure of about 100 to 150 lbs. of fruit bunch per palm, the approximate figure obtaining for the control plots on Estate A and Field 5D.

MANURIAL EXPERIMENT ON YOUNG OIL PALMS.

PLANTED DECEMBER 1929.

ESTATE C.

HILL QUARTZITE SOIL.

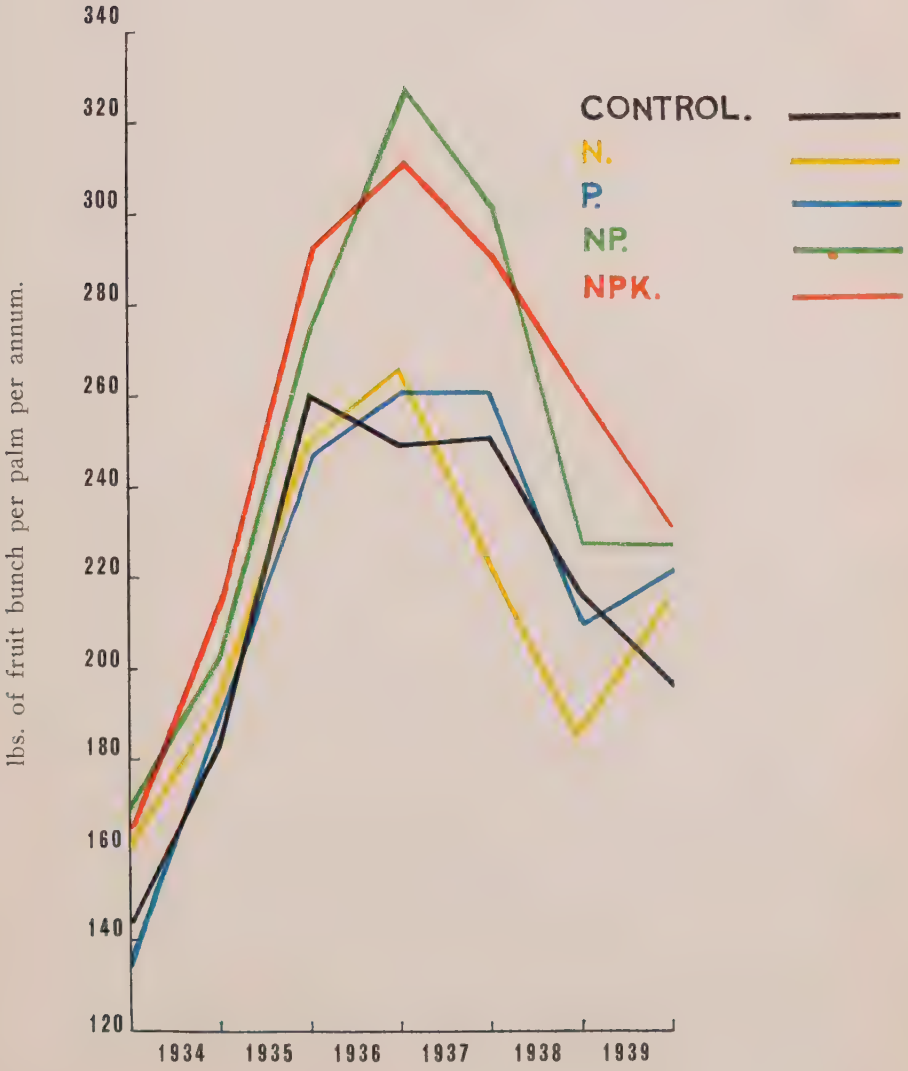

Table XIII.

Estate C. Palms Planted 1929.

Record of manures applied.

Year	NPK		NP		P		N		Control.	
	Manure	Quantity	Manure	Quantity	Manure	Quantity	Manure	Quantity	Manure	Quantity
		lbs.		lbs.		lbs.		lbs.		lbs.
1932 July	$N_2P_2K_1$	$\frac{1}{2}.1.\frac{1}{2}$	N_2P_2	$\frac{1}{2}.1$	P_2	1	N_2	$\frac{1}{2}$	—	
1933 Feb.	$N_2P_2K_1$	$\frac{1}{2}.1.\frac{1}{2}$	N_2P_2	$\frac{1}{2}.1$	P_2	1	N_2	$\frac{1}{2}$	—	
Sept.	$N_2P_2K_1$	$\frac{1}{2}.1.\frac{1}{2}$	N_2P_2	$\frac{1}{2}.1$	P_2	1	N_2	$\frac{1}{2}$	—	
1934 Feb.	$N_2P_2K_1$	$\frac{1}{2}.1.\frac{1}{2}$	N_2P_2	$\frac{1}{2}.1$	P_2	1	N_2	$\frac{1}{2}$	—	
1935 July	$N_2P_3K_1$	2.4.2	N_2P_3	2.4	P_3	2	N_2	2	—	
1936		—		—		—		—	—	
1937		—		—		—		—	—	
1938 July	$N_2P_3K_1$	1.2.1	N_2P_3	1.2	P_3	2	N_2	1	—	
1939 January	$N_2P_3K_1$	1.2.1	N_2P_3	1.2	P_3	2	N_2	1	—	
July	$N_2P_3K_1$	2.4.2	N_2P_3	2.4	P_3	4	N_2	2	—	

Key.

N_2 = calcium cyanamide. P_2 = basic slag

K_1 = potassium sulphate. P_3 = rock phosphate

Table XIV.

Estate C. Mean Weight of Fruit Bunch per Palm per Annum.
(lbs.)

Treatment.	Nov. 1932* to Dec. 1933*	1934*	1935*	1936	1937	1938*	1939*
NPK ...	163	214	291	310	289	259	231
NP ...	166	201	274	326	299	226	226
P ...	134	191	246	260	260	209	221
N ...	159	190	249	265	223	185	215
Control ...	144	184	260	249	251	217	197

* manurial dressings applied during this year: for details see Table XIII.

Table XV.

Estate C. Yields Expressed as Percentage of Controls.

Treatment.	Nov. 1932* to Dec. 1933*	1934*	1935*	1936	1937	1938*	1939*
NPK ...	113	116	112	124	115	119	117
NP ...	115	109	105	131	119	104	115
P ...	93	104	95	104	104	96	112
N ...	110	103	96	106	89	85	109
Control ...	100	100	100	100	100	100	100

* manurial dressings applied during this year: for details see Table XIII.

Table XVI.

Estate C. Palms Planted 1929.

Calculated Yields in lbs. of Oil per Acre per Annum.

(Table XIV recalculated on the basis of 55 palms per acre and 16 per cent. oil on bunch weight.)

Treatment.	Nov. 1932* to Dec. 1933*	1934*	1935*	1936	1937	1938*	1939*
NPK ...	1435	1885	2560	2730	2545	2280	2035
NP ...	1460	1770	2410	2870	2630	1990	1990
P ...	1180	1680	2185	2290	2285	1840	1945
N ...	1400	1670	2190	2335	1960	1630	1890
Control ...	1270	1620	2290	2190	2210	1910	1735

* manurial dressings applied during this year: for details see Table XIII.

The effect shown by the NP dressing on these palms supports the suggestion made in connexion with Field 5D, that NP dressings may be more beneficial than P alone. The simplest explanation of this would be that the nitrogen increases the vegetative growth of the palm which causes it to make a greater demand for phosphate. The increased uptake of phosphate would naturally be reflected in fruit production.

Table XVII gives the mean number of bunches per palm produced by palms of each treatment. It shows quite clearly that a great number of bunches is produced by the palms in the early stages of life but that the number gradually declines. There is a suggestion in the figures that the manuring carried out so far has had a slight effect on the numbers of bunches. At 10 years the control plots are producing an average of 6.2 bunches per palm, which is a little below the average figure for the control plots on Estate A at the same age. It is also below the corresponding figure for Field 5D, Serdang, at 11 years old. (The figure for 10 years old cannot fairly be considered as it was recorded for 6 months only).

The average weight of bunches, however, as given in Table XVIII shows that on all plots, including the control, the bunches have increased in weight with age and at 10 years old the weight of the bunches from the unmanured plots is considerably above the figures recorded for similar plots on Estate A and Field 5D at the same stage.

Table XVII.

Estate C. Mean Number of Bunches per Palm.

Treatment.	Nov. 1932* to Dec. 1933*	1934*	1935*	1936	1937	1938*	1939*
NPK ...	14.4	12.4	12.8	12.4	10.4	8.6	6.9
NP ...	14.1	10.1	11.5	12.0	10.0	7.1	6.3
P ...	13.1	10.8	10.7	10.1	8.7	6.4	5.9
N ...	14.3	11.2	10.5	10.3	7.9	5.9	6.4
Control ...	13.2	11.1	12.2	9.9	8.6	7.1	6.2

* manurial dressings applied during this year: for details see Table XIII.

Table XVIII.

Estate C. Average Bunch Weight.

(lbs)

Treatment.	Nov. 1932* to Dec. 1933*	1934*	1935*	1936	1937	1938*	1939*
NPK ...	11.3	17.2	22.7	25.0	27.8	30.2	33.5
NP ...	11.7	19.9	23.8	27.2	29.9	31.8	35.9
P ...	10.2	17.7	23.0	25.8	29.9	32.7	37.5
N ...	11.1	17.0	23.7	25.8	28.2	31.4	33.6
Control ...	10.9	16.6	21.4	25.2	29.2	30.5	31.8

* manurial dressings applied during this year: for details see Table XIII.

Wilting and Bronzing of Oil Palm Leaves.

Several small observational experiments have been carried out at Serdang in connexion with this problem.

(1) In November, 1936, deep manuring was carried out on certain palms in Field 10, by sinking either pits or bore holes into the root system; the holes thus made were filled with one of the following:—

(a) Layers of compost.
(b) Layers of bunch residue.
(c) Layers of cattle manure.
(d) Layers of top soil and grass.
(e) 10 lbs. rock phosphate dust with either ammonium sulphate, sodium nitrate, or ground horn.

By February, 1940, two palms treated with cattle manure and one with compost had improved in appearance, and four palms treated with rock phosphate had improved slightly. There is not sufficient evidence, however, to say that any treatment has had a real effect.

(2) At the beginning of 1937 a series of palms in Field 10A were treated with rock phosphate at the rate of 10 lbs. per palm. This treatment has had no apparent effect.

(3) Two attempts have been made to irrigate wilted palms in Field 21 and Field 10, but due to lack of water during the drier months of the year both experiments failed.

(4) In January, 1938, observational manuring was carried out on certain palms in Field 20B to test the effect of:—

(a) Sodium nitrate dressings in the presence and absence of lime, the latter applied at a rate of 45 lbs. per palm in an endeavour to reduce the acidity of the soils to a pH figure of about 6.0.

(b) Mixtures including the following minor elements: boron, copper, manganese, zinc, cobalt and iodine applied on the surface and at a depth of 9 ins.

(c) Heavy rock phosphate dressings up to 22 lbs. per palm.

(d) Magnesium sulphate dressings up to 6 lbs. per palm.

(e) Nitrochalk dressings up to 9 lbs. per palm.

(f) Sulphate of potash, 10 lbs. per palm.

(g) Various combinations of the above dressings.

By February, 1940, there was no definite evidence that any of these treatments had improved the appearance of the palms.

(5) In April, 1938, a small area in Field 10 on which the palms were bronzing and wilting was treated as follows:—

(a) *Pueraria phaseoloides* sown in strips.

(b) Bunch refuse turned in.

(c) *Pueraria phaseoloides* sown and bunch refuse turned in, and 4 lbs. of rock phosphate per palm broadcast over half plots.

By February, 1940, no visual difference could be observed in the palms, though the effect of the bunch refuse in increasing the growth of the *P. phaseoloides* was clear.

(6) In May, 1939, an area of nearly 6 acres in Fields 17 and 18 was set aside for a replicated randomized-block experiment to test the effects of patent kali 6 lbs. per palm per annum, in combination with clean weeding and *P. phaseoloides;* 4 lbs. rock phosphate per palm was applied as a basal dressing over the whole area. It is too early to expect results from these treatments.

Manurial Experiments on Estates.

Certain estates have carried out or are now carrying out experiments designed by the Department of Agriculture. Three of these estates lie on peat or highly organic soils, two on the Raub Series of soils and one on coastal clay.

On the first estate on peat, where bronzing and wilting were in evidence, observational experiments were carried out on the effect of iron (ferrous) sulphate, rock phosphate, sulphate of potash and calcium cyanamide in conjunction with liming at rates of 10 cwts. and 20 cwts. per acre. The results obtained were completely negative.

On the second estate, two Latin Square experiments were laid down in August, 1937, one on an area of peat 3 ft. deep, and one on an area of old peat which had consolidated somewhat with the underlying clay to give a highly organic soil. The experiment on the peat area consisted of the following treatments:

A.	Control		
B.	Calcium cyanamide	—	4 lbs. per palm per annum.
C.	Double superphosphate	—	2 lbs. per palm per annum.
	Rock phosphate	—	4 lbs. per palm per annum.
D.	Muriate of potash	—	5 lbs. per palm per annum.
E.	C plus D.		
F.	Lime	—	1 ton per acre.

The above treatments were superimposed on a basal dressing of 2 tons of lime per acre (except F) and an annual routine dressing of 4 lbs. rock phosphate per palm over the whole area.

The experiments on the second area consisted of the following treatments:

A.	Calcium cyanamide	—	4 lbs. per palm per annum.
B.	Double superphosphate	—	2 lbs. per palm per annum.
	Rock phosphate	—	4 lbs. per palm per annum.
C.	Rock phosphate	—	6 lbs. per palm per annum.
D.	Ground horn	—	4 lbs. per palm per annum.
E.	Ground horn	—	4 lbs. per palm per annum.
	Rock phosphate	—	4 lbs. per palm per annum.
	Sulphate of potash	—	3 lbs. per palm per annum.
F.	Lime	—	1 ton per acre.

The above treatments were superimposed on a basal dressing of 1 ton of lime per acre and an annual routine dressing of 4 lbs. rock phosphate per palm over the whole area.

Treatments were applied to both Latin Squares in 1938 and 1939 only.

Figures for these experiments are not yet to hand but information received from the manager of the estate indicates that treatments have not had any significant effects. Yields, however, over the whole of this estate are high.

On the third estate situated on peat a randomized block experiment has recently been laid down to determine whether there is any difference in the effect on yield between:

(a) light and heavy dressings of sulphate of potash,

(b) sulphate of potash and patent kali,

(c) 3 lbs. and 4 lbs. rock phosphate as an annual dressing.

No conclusions from this experiment can be expected for 3 or 4 years.

On the first estate on the Raub Series soil a randomized block experiment was laid down at the end of 1939 to test the effect on yields of:

(a) annual phosphate dressings,

(b) NPK dressings once every 3 years,

(a) *Centrosema pubescens* versus *Nephrolepis* sp. as a cover.

It is unlikely that any information will be obtained before 1942.

On the second estate on the Raub Series soil a small observational experiment is in progress on the influence of patent kali on bronzing and wilting.

On the estate on coastal clay a randomized block experiment was laid down in August, 1938, with P, PK, NK, NPK and control treatments. Yields recorded to date show no significant increases due to any treatment. It is hoped that information may emerge during 1940.

Potash Manuring of Oil Palms.

The question of potash manuring of oil palms arose in connexion with the appearance of bronzing and wilting of palms on quartzite and peat soils a few years ago. Manurial experiments carried out up to that time had not shown any necessity for potash manuring, nor had they shown that potash would increase yields. Reports from Sumatra, however, indicated that bronzing and wilting could be overcome by the application of patent kali.

Experiments were immediately laid down by this Department to test the efficacy of various mixtures of potash and magnesium salts in overcoming bronzing. In 1938 estates were advised(3) as an insurance measure, with a view to preventing the outbreak of this bronzing, to apply a complete mixture including magnesium every third year from the twelfth, until more definite results were available.

As was stated earlier in this article under the experiments in connexion with bronzing, no beneficial effects have been obtained by the application of potash or potash and magnesium mixtures. In view of this, therefore, and of the present high price of potash fertilizers the earlier recommendation is withdrawn but it is deemed advisable to continue with annual phosphate dressings, if possible with additional nitrogen dressings at least once in 3 years. This suggestion applies particularly to areas on quartzite soil and, though there is not the same experimental evidence to support it, to areas on peat soils. There is not yet sufficient information available to make any recommendations with regard to palms growing on coastal clays.

The experiment with patent kali which is now in progress at Serdang may subsequently confirm or alter these views in connexion with potash manuring.

General Summary.

Quartzite Soils.

On mature palms there is evidence to show that:—

(i) Economic increases can be obtained by phosphate manuring of areas yielding not more than 1,500 lbs. of oil per acre per annum.

(ii) There is a time lag of about 18 months between the application of phosphate and its effect on yields.

(iii) The effect of phosphate manuring usually extends for about 18 months, but in cases where manuring has been carried out for some time the effect may last longer.

There is no evidence to show that:—

(i) Economic increases cannot be obtained with greater dressings of rock phosphate than 4 lbs. per palm per annum.

(ii) Potash is an essential manurial requirement.

On young palms there is evidence to show that economic increases can be obtained by manuring with complete NPK or with NP mixtures.

Peat Soils.

An experiment reported previously in this Journal(1) indicated that economic responses could be obtained by phosphate manuring on a peat area yielding less than 1,500 lbs. oil per acre per annum. This is the only evidence available, and it was not considered legitimate to subject the results to statistical analysis. Additional evidence on this point is desirable. Certain estates on peat which have adopted phosphate as an annual routine dressing have shown increases in yields; it is not possible, however, to differentiate between the effects of the phosphate and the effects of seasons and age of palms.

There is evidence to show that liming up to 2 tons per acre has no beneficial effects.

The effects of potash and nitrogen are at present unknown though experiments in this connexion are in progress.

Raub Series Soils, Coastal Clays and Granite Soils.

At the present time there is no information available regarding the manurial requirements of oil palms growing on these types of soils. Experiments are in progress which should give information with regard to the first two types.

References.

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MALAYAN AGRICULTURAL TRADE IN 1939 *

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Prices.

For the past few years the market prices for most of the export products of Malayan agriculture have been at a low level. During the latter half of 1936 there was a sharp upward movement of prices; in the first half of 1937 the improvement continued, but a decline in prices was again experienced in the second half of that year. In 1938, prices of all commodities failed to recover, while for many agricultural products the market showed a further steady decline. This decline was most marked in the following export industries:— copra, oil palm products, pineapples, sago, tapioca and derris.

The average price of rubber showed an improvement in 1939, as compared with the previous year; tapioca and sago also commanded higher prices, particularly subsequent to the outbreak of war, but the market prices of all other export products remained at about the same low level, or in some cases tended to decline still further. An exception to this was canned pineapples. The reorganization of the pineapple canning industry was effected and the Central Board of Pineapple Packers by elimination of wasteful competition were enabled to maintain a fairer balance between production costs and selling prices than has been possible in recent years.

Necessarily, markets have been somewhat dislocated since the outbreak of war in Europe, while shipping difficulties and control and marketing regulations have required adjustments in methods of sale in respect of certain of the agricultural products exported from Malaya.

There were signs of increased interest in vegetable oils during the last quarter of the year and the price of oil palm products and coconut oil appreciated. Prices for copra, however, did not share in this improvement and producers were faced with the prospect of continued low prices under the controlled price in the United Kingdom.

Table I shows the average annual prices of the more important products from this country.

Crop Production.

The crops considered under Malayan agricultural trade may be conveniently grouped under four heads, *viz.*, crops grown entirely for local consumption; crops grown entirely for export; crops grown for local consumption and export; and the preparation for world markets of products from neighbouring countries.

* Import and export figures in this review are abstracted from Malayan Statistics, December 1939, published by the Registrar-General of Statistics, S.S. & F.M.S.

Table I.

Average Annual Market Prices in Singapore of Certain Agricultural Products.

Year	Rubber per lb.	Copra per picul	Coconut Oil per picul	Palm Oil per ton	Palm Kernels per ton	Gambier per picul	Sago per picul	Tapioca per picul	Nutmegs per picul	Pepper per picul	Arecanuts per picul	Pineapples per case
	cents	$	$	£ s. d.	£ s. d.	$	$	$	$	$	$	$
1929	34.63	9.45	16.69	28 6 3	18 4 3	14.69	7.98	6.27	46.60	57.31	9.10	
1930	19.15	7.81	14.35	23 7 2	13 5 5	15.30	6.56	4.73	31.03	33.56	8.95	
1931	9.82	5.09	9.69	18 18 3	10 7 7	17.39	5.01	3.59	23.02	20.39	6.75	
1932	6.97	5.74	10.04	17 18 9	11 1 3	14.83	4.25	3.23	24.78	20.44	5.62	3.34
1933	10.21	3.90	7.70	16 0 3	8 16 4	7.70	4.17	4.35	20.50	14.49	6.50	3.11
1934	20.63	2.94	5.96	12 9 3	6 12 8	7.76	3.92	4.13	23.41	16.33	6.50	3.10
1935	20.35	4.54	9.13	19 19 8	8 13 9	10.53	3.86	4.38	29.40	12.37	6.74	3.47
1936	27.04	5.81	11.96	19 18 2	11 0 11	10.30	4.10	5.50	29.62	8.36	6.83	3.29
1937	32.09	6.45	11.13	22 3 4	12 14 5	15.71	5.24	5.15	34.77	9.91	7.71	3.02
1938	24.39	3.53	7.53	14 3 10	8 19 3	15.34	3.78	3.16	31.15	8.24	7.64	2.79
1939	31.00	3.60	8.94	13 17 7	8 16 3	16.10	5.66	5.57	29.38	8.11	6.49	3.49

Crops Grown Entirely for Local Consumption.

The chief crop under this heading is rice; vegetables, fruits, coffee and tobacco also come under this category.

Rice.—In the 1938-39 season the production of rice amounted to 341,455 tons from an area of 753,240 acres. The area planted was the greatest for some years, while the season proved favourable and the yield has only in one year been exceeded. The price paid at the mills for padi was higher than in 1938 and towards the end of the year the Government mills in Krian, Perak, guaranteed a price of $2.50 per picul for a period of three years, commencing January, 1940. The average wholesale price of imported rice was lower than in 1938, but increased from the outbreak of the European War.

Local production supplied only 34 per cent. of rice requirements, net imports, excluding padi and rice meal and bran, reaching the high record figure of 658,653 tons. For the first time, the annual total consumption passed the one million tons mark. It is probable, however, that this figure is in excess of actual consumption, inasmuch as part of the bumper local crop will remain in stock for some time, while increased imports on the outbreak of war were designed to increase local stocks against a possible shortage of supply in 1940. It may well be, therefore, that the 1940 figures will show a more favourable balance of local production to total consumption.

The value of Malayan production in 1939, based on the wholesale price of Rangoon rice in Singapore was approximately $20,800,000, as compared with $18,800,000 in 1938.

Vegetables and Fruits.—The local production of vegetables and fruits is considerable, but neither the extent of the crops nor their value is known. Vegetable gardens are found near all centres of population, and in some districts, notably Singapore and Johore, have extended considerably of late. Almost all of these market gardens are owned by Chinese, who appear to experience no difficulty in disposing of their produce in the local markets. Malays own most of the fruit trees, although there are also many good Chinese-owned orchards in some parts of the country.

The demand for most fruits fluctuates according to the seasons, but the local market for bananas is fairly steady throughout the year and extensive areas under this crop in certain States produce large quantities of fruit which are transported for considerable distances to supply the markets.

In addition to local production—all of which is consumed in this country—there is a very considerable import of both fresh fruits and vegetables from neighbouring countries.

Tobacco.—Tobacco has proved a useful crop to the market gardener for it is suitable for rotation with vegetables and provides a ready cash return to the cultivator. The crop is nowhere grown extensively, but is found in small areas throughout the country. The leaf is sold to local Chinese-owned factories where it is usually manufactured into cheap cheroots which find a ready sale amongst the labouring class. No statistics are available as to the extent of this industry.

The local tobacco industry enjoys a measure of Government protection since there is an import duty on tobacco and no excise duty is levied.

Coffee.—Coffee is grown in various parts of the country, and in particular along the west coast. Interest in this crop is not great despite the fact that crops are readily saleable in this country.

Crops Grown Entirely for Export.

The principal of the crops grown entirely for export are rubber, canned pineapples, oil palm products, gambier and derris.

Rubber.—The production of rubber in 1939 totalled 361,484 tons, as compared with 360,898 tons in 1938. Shipments during the year were 375,474* tons as compared with 370,810 tons* in 1938. The value of net exports of rubber in the year under review was $261,051,647 as compared with $198,650,206 in 1938. Local consumption of rubber by manufacturers of various kinds of goods amounted to only 511 tons.

The export of rubber in concentrated forms of latex continued to expand and amounted to the equivalent of 22,515 tons of dry rubber. (This figure is included in the export figure stated in the previous paragraph).

The second International Agreement (1st January, 1939, to end of 1943) for the regulation of rubber production was in operation throughout the year. Malaya's basic quota was 632,000 tons out of a world quota of 1,519,000 tons and the international quarterly releases were (per cent.) 50, 50, 60 and 75. Malayan domestic releases under the scheme were $2\frac{1}{2}$ per cent. below the above international releases throughout the year.

Canned Pineapples.—The canning industry is confined to Singapore, Johore and Selangor. Exports of canned pineapples amounted to 65,802 tons, valued at $9,928,137 as compared with 56,908 tons, valued at $7,262,444 in the previous year. (Exports are now based on a net weight of 56 lbs. of fruit per case of 48 cans.) The development of canned pineapple juice is in its infancy, exports being less than 100 tons, valued at $44,204. In view of the fact that two factories are now equipped with machinery for canning juice, further developments may be expected in this direction.

The Central Board of Pineapple Packers was formed at the end of 1938 with the object of controlling production and fixing the price of the canned product. The Board fixed the production quota for the season April to September, 1939, at 1,200,445 cases, and for the " small season " September, 1939, to February, 1940, at 950,000 cases. The Board reorganized the basis of purchase of fruit at factory with the primary object of encouraging the sale of fruit in the right stage of ripeness in order to increase the percentage of the highest grade (Golden) in the canned product.

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* Excluding Brunei.

The pineapple growers in Johore and Singapore formed an association in September with the object of regulating fruit production to conform with the quota fixed by the Central Board.

Oil Palm Products.—Palm oil is used locally to some extent in soap manufacture, but in the main, the palm oil and kernels produced locally are exported. The exports of palm oil were 59,712 tons, valued at $5,911,648 as compared with 54,377 tons, valued at $6,221,266 in 1938. Kernels exported were 10,774 tons, valued at $545,309, as compared with 9,359 tons, valued at $529,932 in 1938.

The industry has made rapid strides. In the past 10 years the area has increased from 8,000 to 75,000 acres, and exports of oil and kernels from 2,000 to 70,000 tons. During this period the value of annual exports increased from $500,000 to $6,500,000. Further increases may be anticipated as new areas come into production and other areas reach maximum production.

Gambier.—Gambier, once a crop of considerable importance, is now relatively unimportant due to a falling off in the world demand for this product. The local trade includes production in this country for export and the import of gambier for re-export. Net exports in 1939 were 1,572 tons, valued at $410,028.

Derris.—Derris (tuba root) has for some time commanded considerable local attention and every effort is being made to produce a quality root which will prove attractive to the American market. In 1939, the net exports were 1,356 tons, valued at $492,395 as compared with 676 tons, valued at $306,801 in 1938. The United States continued to be the most important buyer, 63 per cent. of exports having been consigned to that country.

Crops Grown for Local Consumption and Export.

The chief amongst crops grown both for local consumption and for export are: copra and coconut oil, tea, tapioca and sago.

Copra and Coconut Oil.—Owing to the very large quantity of fresh nuts and coconut oil used locally, the total production in Malaya is unknown but must be considerable. The feature during recent years of the export trade has been the constantly increasing quantities of oil exported, with a diminution of exports in the form of copra. In other words, the local milling industry has developed and the produce marketed as oil rather than as copra.

Net exports of coconut oil in 1939 amounted to 61,360 tons, an increase of over 12,000 tons on the figure for 1938. On the other hand net copra exports were 34,420 tons, as compared with 68,754 tons in the previous year and an average of about 100,000 tons annually between the years 1923 and 1935.

The total value of net exports of coconut products in 1939 was $11,028,359, as compared with $11,750,000 in 1938 and $17,760,000 in 1937. These figures reflect the very low prices ruling during the past two years.

Tea.—The area under tea has steadily increased during the past decade, and crops now being marketed show that production per acre is fully up to expectations. The crop in 1939 was less than expected due to the long dry spells of weather experienced.

Total production in 1939 was estimated to have been 1,553,000 lbs. of which 647,871 lbs. were exported. There is still a considerable import of tea into this country—net imports in 1939 were 3,533,806 lbs.—but it is probable that Malayan production in the future will still further bring about a reduction in the amount which is imported.

The planting of tea is restricted under an agreement reached between this country and the International Tea Committee. This Agreement restricts the planting of tea within certain limits.

Tapioca.—The net exports of tapioca amounted to 16,639 tons, valued at $1,230,157. An increase in the area planted indicates that exports in the next two or three years at least will be fully maintained.

Sago.—Net exports of sago in 1939 were 9,031 tons, valued at $1,554,588. The trade appears to be flourishing, exports and values being above the average of the past 20 years.

Preparation of Agricultural Products for World Markets.

For many years Malaya has been an established centre for the preparation of agricultural products for world markets. For this trade, which is principally centred in Singapore, produce in a raw or semi-prepared form is further manufactured or is graded and packed for export in acceptable forms.

At one time the import of wet slab rubber, mainly from the Netherlands Indies, was considerable. This was converted into dry rubber in Singapore for re-export. Of recent years, however, the preparation for market of rubber from Netherlands Indies small holdings has been given increasing attention in the country of origin, to the detriment of this industry in Singapore rubber factories.

Chief amongst other crops that are imported for conditioning in this country are copra, arecanuts, sago, tapioca, gambier, mace and nutmegs, and pepper. The import of these eight products in 1939 amounted to 262,000 tons, as compared with 239,000 tons in 1938.

Copra imports are mainly used for the production of oil; the imports in 1939 amounted to 123,000 tons. Sago and tapioca are imported in a raw form—imports were 62,000 tons and 6,600 tons respectively—and manufactured into pearl, bullet, flake and other recognized grades for export. Pepper imports were 13,288 tons, some of which is bought as black pepper and exported as white, while a proportion is merely re-exported. Arecanuts were imported to the extent of 52,650 tons, part of which is regraded for export.

Tables II A and B show the trade in the chief products and also the value of the entrepôt trade and that of conditioning agricultural products for the world markets. Table IIB shows the chief products imported into Malaya for local consumption.

Table IIA.

Export Products:

Imports and Exports of Certain Agricultural Products 1939*.

Product	Imports		Exports		Net Exports	
	Tons	Value $	Tons	Value $	Tons	Value $
Rubber ...	177,800	113,089,000	553,300	374,141,000	375,500	261,052,000
Coconut Products ...	124,900	7,278,000	238,400	18,307,000	113,500	11,029,000
Pineapples ...	—	—	65,800	9,928,000	65,800	9,928,000
Oil Palm Products ...	100	6,000	70,600	6,463,000	70,500	6,457,000
Arecanuts ...	52,600	4,732,000	91,100	9,526,000	38,500	4,794,000
Tapioca ...	6,600	505,000	23,200	1,735,000	16,600	1,230,000
Sago ...	62,000	3,478,000	71,000	5,032,000	9,000	1,554,000
Gambier ...	2,800	524,000	4,400	934,000	1,600	410,000
Derris ...	100	38,000	1,500	531,000	1,400	493,000
Pepper ...	13,300	2,387,000	15,100	3,017,000	1,800	630,000
Nutmegs and Mace ...	1,700	610,000	1,400	740,000	— 300	+ 130,000

* Imports to nearest 100 tons; values to nearest $1,000
+Net exports
—Net imports.

Table IIB.

Import Products:

Imports and Exports of Certain Agricultural Products 1939*.

Product.	Imports		Exports		Net Imports	
	Tons	Value $	Tons	Value $	Tons	Value $
Rice and Padi ...	876,800	54,326,000	166,200	10,261,000	710,600	44,065,000
Livestock, Meat, Milk and Butter ...	50,300	16,495,000	3,700	1,691,000	46,600	15,254,000
Tobacco ...	7,000	16,648,000	1,100	2,252,000	5,900	14,396,000
Sugar ...	148,900	12,969,000	16,000	1,455,000	132,900	11,514,000
Feeding Stuffs ...	200,200	5,684,000	13,200	456,000	187,000	5,228,000
Vegetables ...	81,000	6,403,000	19,400	1,626,000	61,600	4,777,000
Fruits ...	27,800	4,508,000	4,800	791,000	23,000	3,717,000
Groundnuts & Groundnut Oil ...	22,700	3,373,000	2,300	423,000	20,400	2,950,000
Poultry and Eggs ...	5,200	1,721,000	400	149,000	4,800	1,572,000
Coffee ...	10,400	2,051,000	4,000	787,000	6,400	1,264,000
Tea ...	2,200	1,563,000	700	722,000	1,500	841,000

* Imports to nearest 100 tons; values to nearest $1,000.

The Value of Agricultural Trade in Malaya.

In attempting to strike a balance of exports against imports of agricultural products, the crops taken into consideration are those actually grown in Malaya and also crops which at least theoretically, although perhaps not economically, might be grown in this country. For instance, castor oil which can be grown in Malaya, but not economically, is included, while wheat, a temperate climate crop which cannot be grown locally, is excluded.

The gross agricultural trade of Malaya in 1939 amounted to 3,259,205 tons, valued at $713,523,000. Detailed figures for this year, and a comparison with previous years, are given in Table III.

Table III.

Gross Agricultural Trade of Malaya

Year	Gross Agricultural Trade ,000		Gross Trade in Rubber ,000		Gross Agricultural Trade Less Rubber ,000		Gross Agricultural Trade Less Rubber and Rice* ,000	
	Quantity Tons	Value $	Quantity Tons	Value $	Quantity Tons	Value $	Quantity Tons	Value $
1935 ...	2,958	533,000	765	327,000	2,193	206,000	1,194	155,000
1936 ...	2,998	609,000	688	398,000	2,310	211,000	1,248	152,500
1937 ...	3,249	875,000	895	628,000	2,354	247,000	1,497	189,000
1938 ...	3,125	566,000	683	347,000	2,442	219,000	1,419	152,000
1939 ...	3,259	713,000	731	487,000	2,528	226,000	1,485	162,000

* Including padi.

The two main products of agricultural trade are, firstly rubber, in which exports by far exceed imports, and secondly rice, in which imports for local consumption greatly exceed exports. Of the total volume of agricultural trade in 1939, 32 per cent. was rice and padi and 22 per cent. rubber. In order, therefore, to view the extent and value of the agricultural trade in other crops, figures are stated in Table III of the gross agricultural trade, and the gross trade less rubber and rice respectively. These figures show an increase in the trade of both rubber and rice with an increased value of both trades. It is also shown that the trade in other agricultural products increased by 66,000 tons and $10,000,000 in value as compared with the previous year.

The actual value to Malaya of her agricultural trade may be assessed by consideration of the balance of net exports over net imports. Table IV reviews the position annually since 1923.

Table IV.

Annual Net Imports and Exports of Agricultural Products, Malaya.

Year.	Net Imports*		Net Exports† (excluding rubber)		Excess of Imports over Exports (excluding rubber)		Net Exports of Rubber		Excess of Total Imports over Exports	Excess Value of Exports over Value of Imports
	Quantity Tons	Value $	Quantity Tons	Value $	Quantity Tons	Value $	Quantity Tons	Value $	Quantity Tons	Value $
1923	643,000	101,600,000	206,600	43,100,000	436,400	58,500,000	181,700	227,200,000	254,700	168,700,000
1924	694,600	118,400,000	219,000	51,600,000	475,600	66,800,000	152,500	189,900,000	323,100	123,100,000
1925	744,800	133,100,000	218,700	48,600,000	526,100	84,500,000	161,800	519,000,000	364,300	434,500,000
1926	857,300	157,400,000	225,800	50,000,000	631,500	107,400,000	243,400	547,500,000	388,100	440,100,000
1927	956,000	167,400,000	207,500	42,700,000	748,500	124,700,000	190,700	351,400,000	557,800	226,700,000
1928	921,400	158,900,000	230,700	44,900,000	690,700	114,000,000	260,100	262,900,000	430,600	148,900,000
1929	1,004,500	171,700,000	254,700	44,000,000	749,800	127,700,000	418,000	353,700,000	331,800	226,000,000
1930	1,022,300	150,800,000	244,100	37,800,000	778,200	113,000,000	421,000	199,600,000	357,200	86,600,000
1931	883,200	92,100,000	241,200	26,700,000	642,000	65,400,000	393,600	99,300,000	248,400	33,900,000
1932	737,800	74,200,000	253,500	29,000,900	484,300	45,200,000	386,000	68,100,000	98,300	22,900,000
1933	770,000	66,700,000	265,700	25,600,000	504,300	41,100,000	445,700	101,400,000	58,600	60,300,000
1934	871,200	78,700,000	272,800	23,400,000	598,400	55,300,000	465,800	207,900,000	132,600	152,600,000
1935	885,100	81,100,000	314,500	40,000,000	750,660	41,100,000	415,700	191,100,000	154,900	150,000,000
1936	991,900	87,100,000	311,400	36,700,000	680,500	50,400,000	352,300	208,500,000	328,200	158,100,000
1937	1,081,200	103,200,000	328,500	42,500,000	752,700	60,700,000	468,200	341,200,000	284,500	280,500,000
1938	1,110,700	102,900,000	325,300	33,700,000	785,400	69,200,000	370,800	198,700,000	414,600	129,500,000
1939	1,211,600	107,100,000	319,100	36,900,000	892,500	70,200,000	375,500	261,000,000	517,000	190,800,000

* Imports include coir cordage and fibre, mats and matting, padi and rice, coffee, tea, kapok, mace and nutmegs, pepper, ginger, groundnuts and groundnut oil, sugar, tobacco, vegetables, livestock for food, meat, leather goods, milk, butter, poultry and eggs, feeding stuffs for animals, ataps, cloves, castor oil, gingelly seed and oil, fruits, citronella oil and flowers.

† Exports include rubber seed, coconut products, palm oil and kernels, canned pineapples, arecanuts, sago, tapioca, derris root, hides and skins, gambier, patchouli leaves and oil, mace and nutmegs, pepper and gambier.

Agricultural imports exceeded exports by 517,000 tons, the highest since 1927, as compared with 414,600 tons in 1938, but the value of exports exceeded the value of imports by $190,800,000, as compared with $129,500,000 in 1938 and $280,500,000 in 1937. The increase in net imports is largely due to increased imports of rice and padi, whereas the increase in value of net exports is largely due to the greater quantity and higher value of rubber exports. It is evident, therefore, that our agricultural trade continues to be profitable, although Malaya has in no degree lessened her reliance on outside sources for some of her most essential needs.

Received for publication, 15th May, 1940.

Notes and Comments.

ECONOMICS OF FOOD PRODUCTION.

In the following pages we publish abstracts of two interesting articles concerning food production in the tropics which we believe have a very definite bearing on the accepted policy regarding food production in Malaya. The first of these articles deals in a general manner with food production in the tropics under peace time conditions, while the second discusses the economics of food producton in Malaya with particular reference to the war.

Under the title " Food Production in the Wet Tropics," it is contended that the agricultural policy in the wet tropics should be the production of important export crops, (cacao, rubber, oil and coconut palms, coffee, tea, sugar cane and bananas are instanced), for which these regions are particularly well adapted, and that the important staple food crops, such as maize, rice, sorghum and the pulses should be left to the semi-arid tropical regions which are much more suited to their production. It is conceded, however, that the policy in the wet tropics should also encourage the production of the ancillary food-stuffs, root crops and fruits, vegetables and animal products, the peasant being encouraged to devote a reasonable proportion of his holding to food production. The basis of peasant agriculture, it is contended, must be the keeping of stock and the sale of animal products.

Turning to the other article, in the chapter "Malaya and the War" of his essay, Mr. Goh Keng Swee contends that in peace time there is little to recommend in the rigorous pursuit of self-sufficiency as regards food supplies if the free working economic laws ordain otherwise. He appears to look upon the necessity of increasing local food supplies in peace time as a safeguard against hostilities which might disrupt our supplies from abroad, and in war time as a similar safeguard and additionally as a means of conserving our credits of foreign exchange.

In the main we agree that the function of first importance in the wet tropics (which of course includes Malaya) is the production of the staple export crops for which these regions are particularly fitted, but we are at variance with both writers as to the very secondary place which should be taken by food production in these areas. It is stated that rice, among other food crops, though it can be grown in the wet tropics, can be produced more cheaply in the semi-arid continental plains. We believe, however, that the cost of production in Malaya compares not unfavourably with the semi-arid regions, and it certainly compares favourably with the cost to ourselves of rice imported into this country.

We consider that Malaya is eminently suited to the production of her staple food crop rice, and is capable of growing economically a wide range of fruits and vegetables towards making herself more nearly self-sufficient as regards her food requirements. Furthermore, we contend that a greater degree of self-sufficiency is justified, not only as a war measure, but equally as a peace-time policy provided that this object can be achieved, and we believe it can, without interference with the production of the main export crops. The main export industries of this country are subject to successive booms and slumps; the cost of imported foodstuffs, however, does not rise and fall in sympathy. The accepted policy of increasing local food

production and thereby reducing imports is therefore not only feasible but provides the best insurance against the distress amongst the local population which is an inevitable concomitant of a slump in either of our main export industries—tin and rubber.

FOOD PRODUCTION IN THE WET TROPICS.

The fundamental difficulty in food production in the wet tropics, *Tropical Agriculture* points out in the editorial article under the above title included in the April 1940 number, appears to arise from the fact that these parts of the world are not particularly suited to the production of the annual arable food crops, but are eminently well adapted to the production of such important crops as cacao, rubber, oil and coconut palms, coffee, tea, sugar cane and bananas. These crops generally cannot be grown at all and can never be grown economically outside these areas. Moreover, the area in which they can be produced is limited since the wet tropics in total extent are relatively small as compared with the continental plains and plateaux of the semi-arid and temperate regions.

Another disadvantage of the wet tropics for the production of food is that wage rates are generally high and this disparity between wages and price of food is typical of the economics of the tropics.

The semi-arid tropical regions are well adapted to the production of the important staple foods such as maize, rice, sorghum and the pulses. These crops cover a much wider range of climatic conditions and they can generally be grown also in the wet tropics. They are, however, produced more cheaply in the semi-arid continental plains because in the dry climate fertility has not been lost by leaching during the growing of the crop as it is by tropical rains and is cheaply renewed by dry fallowing. Also, large scale mechanical cultivation is peculiarly suited to these continental plains, and finally, some of these areas are still liquidating "virgin fertility." Since staple food crops are eminently suitable for transport and trade, the price in any particular region tends towards the world price.

The wet tropics should therefore concentrate attention mainly on producing the essentially tropical products which they alone can produce, and import much of their staple grain foods from the semi-arid or temperate regions.

In spite of these objections to large scale production of staple grain foods in the wet tropics, the Journal points to factors which favour the production in these regions on a limited scale of such foodcrops as roots, green vegetables, fruits and animal products, as these products cannot be imported cheaply, while the local producer, who is content with a small cash income, can readily find a local market for his crops.

Generally, the main object of the tropical food producer must be the growing of the ancillary food-stuffs, root crops and fruits, vegetables and animal products, rather than the staple grains and pulses. The staple food products should be grown only for local consumption and for the sake of diversifying and rotating crops.

The keeping of stock and the sale of animal products must be the basis of peasant agriculture, for not only is it a suitable occupation for the peasant, but the producer has an advantage over the importer in the local market, while the particular value of farmyard manure in the tropics must not be overlooked.

The object of Government in the wet tropics should not be to discourage the peasant from wage-earning or from growing tropical staples, but to ensure that he devotes some reasonable proportion of his holding to food production. Finally, every means should be taken to assist the peasant to sell the food products, which he produces in little more than retail quantities.

The foregoing remarks, concludes *Tropical Agriculture*, apply to peace time conditions. In war time Colonial Governments may well have to modify their policies very greatly and to disregard the fundamental factors of peace time economy by introducing such restrictive and other measures as they may think fit.

MALAYA AND THE WAR.

An essay by Mr. Goh Keng Swee, under the title of "The Economic Front from a Malayan Point of View" has recently been published by the Straits Settlements Government. In Chapter III the author shows the part which Malaya is called upon to make towards the Empire's war effort. He points to the fact that our contribution is mainly by economic means, which though unsensational is incomparably more valuable than any military help we can give.

The Malayan economic system, the author continues, is essentially an "open" one, an antithesis to a "closed" or self-sufficient system. The two great industries dominating the system, rubber and tin, are export industries, having their markets in the highly industrialized countries. Malaya's total supply of rubber amounts to 41 per cent. of world supply and her output of tin to 37 per cent.

To have to depend on the export industries and thereby share the instability of world economic conditions, manifested by successions of booms and slumps, is possibly a disadvantage under peace-time conditions. But in the prosecution of a war, it is in the highest degree advantageous to possess a large export trade which can secure foreign exchange to cover imports of munitions and essential goods.

From the point of view of securing foreign exchange, it is fortunate that a large proportion of Malaya's export trade flows to the United States of America. This is especially useful if one considers the "cash-and-carry" basis on which Great Britain and the belligerent countries have to finance their imports. Great Britain will have to pay for her imports of munitions and planes from the United States either by the current earnings of American currency by sterling countries, or by the liquidation of her holdings of American securities and gold. Since the liquidation of the nation's interest-earning assets and gold reserves must be avoided as far as possible, current earnings of American dollars are of the greatest economic value. These Malaya provides to an extent that is not realized even by most Malayans. The value of our economic contribution to the Empire can be judged by the fact that in 1937, Malaya ranked, amongst the countries outside the American dollar bloc, as the biggest exporter to the United States and the second biggest among all countries of the world, our favourable trade balance with the United States in that year being $383 million (Malayan). Of total exports to the United States, rubber took $253 million and tin $132 million (Malayan).

Mr. Goh Keng Swee refers to Malaya's other export industries, including palm oil, pineapples, copra and coconut oil, but shows that most of these go to countries inside the sterling group and therefore have less significance as contributors of foreign currencies. He also refers to the entrepot trade, upon which the prosperity of the Straits Settlements depends to a certain degree, and points out that because of the difficulty of recapturing entrepot trade once it has been diverted along other channels, it is desirable to maintain this trade during the war, even though it adds greatly to the complexity of exchange control. The main items of tropical produce imported for re-export are rubber ($143 million), tin ore and concentrates ($43 million), copra ($10 million), rice ($10 million), motor spirit, kerosene and liquid fuel, and various native and jungle produce such as arecanuts, cloves, gums, groundnuts, illipenuts, nutmegs, pepper and rattans.

It has been suggested that Malaya should develop greater self-sufficiency, especially as regards her food supplies. From a purely economic point of view, Mr. Goh Keng Swee states, there is little to recommend in the rigorous pursuit of self-sufficiency, as a peace time measure, if the free working economic laws ordain otherwise. But, he continues, under the threat of a war, or in the prosecution of one, certain conditions of strategy and war policy arise, and these may well overrule purely economic considerations. It is obvious that complete independence of foreign supplies of manufactured goods cannot be obtained in Malaya, and the problem is narrowed down to the production of her own essential foodstuffs.

In the past few years, many people have deplored Malaya's dependence on foreign supplies of food and urged self-sufficiency in foodstuffs as a safeguard against hostilities occurring in this part of the world, which might threaten to disrupt our supplies of food. The need for reducing our imports of foodstuffs by growing more ourselves has increased of late, for in addition to the above argument in favour of greater local food production, the payment for imports of foodstuffs absorbs a fairly considerable proportion of foreign exchange; attempts to reduce our dependence on foreign supplies of foodstuffs are therefore consistent with our general war efforts.

The most important foodstuff is rice. The proportion of home-grown rice to our total consumption, the author contends, normally depends to a large extent on the state of prosperity of the rubber and tin industries, for high prices of rubber induce small-holders cultivating rice to turn part of their attenion to rubber and to neglect their rice cultivation. Also high prices of rubber and tin result ultimately in a large immigration of labourers from Southern India and China (all rice eaters) to work on rubber estates and in tin mines, thus increasing Malay's consumption of rice. In applying these facts to current conditions, the author concludes that it becomes clear that our efforts to reduce imports must be all the greater since consumption of rice is likely to increase during the War.

Departmental.

FROM THE DISTRICTS.

Compiled in the Office of the Chief Field Officer from Monthly Reports of Agricultural Officers.

May, 1940.

The Weather.

Ample rain fell in most parts of the country during May and the total precipitation was up to normal. Malacca was not so fortunate as the rainfall was very uneven and heavy showers were followed by dry spells, so that water supplies continued to be below normal.

Crop Reports.

Rubber.—The market for rubber improved during the month, and good quality smoked sheet reached a price of $47 per picul. Coupons also fetched a high price—$33 to $34 in some places.

Padi.—The rain has enabled cultivators to commence work on their land. In Province Wellesley, however, unirrigated padi land was still too dry to commence operations.

In the Krian area the average yield for the past season was 330 gantangs per acre. In the Sungei Manik area the average yield per acre in Stages I and II was 258 and 176 gantangs as compared with 300 and 163 gantangs for the previous season. The decrease is attributable mainly to labour difficulties at harvest (of which mention was made in a previous report). Some reduction in crop was also caused by pest damage and water shortage during dry spells in November and December.

The Government Rice Mills in Krian re-commenced buying padi during the month. Up to 27th May the mills had bought 286,180 piculs of padi since the beginning of the season. Of this, 233,120 piculs (81 per cent.) were Seraup 48 and received the usual premium for this strain of 10 cents a picul. The new mill at Teluk Anson has so far bought 7,000 bags (10,649 piculs) of locally grown padi; of this, 1,953 bags were Seraup 48. At present very little local padi is being purchased as Chinese dealers in the area are paying higher prices than those offered by the mill.

The Selangor Government has bought 2,860 piculs of seed padi which will be distributed to planters in the Panchang Bedena padi area who lost their crops last season and, therefore, have no seed padi. Many of the people who left the district after the failure of their crops, having heard the news, are now returning. This seed padi has been obtained from north Malaya; 2,342 piculs have so far been received and are being stored until required.

Coconuts.—The copra market has remained dull and prices poor. It is reported that at Benut in Johore large quantities of nuts were unsaleable and were allowed to go to waste.

Tobacco.—Penang growers are now receiving $54 per picul for their tobacco. As a result new areas are being planted.

Flowers at Cameron Highlands.—The Agricultural Officer in his report draws attention to the lack of interest that has up to the present been shown in the growing of flowers for supplying the Malayan market. A considerable demand for cut flower exists and quantities of flowers used to be imported by air from the Netherlands Indies for sale in the towns of Malaya. These flowers were sold at a high price but the import is now prohibited. Not only is it possible to grow all these imported flowers at Cameron Highlands but many other flowers not ordinarily on sale at flower shops in Malaya grow remarkably well in the Highlands and if grown commercially should prove profitable. The arum lily is an instance of one such for which there is a brisk local demand.

AGRICULTURAL LEAFLETS.

Attention is drawn to the series of Agricultural Leaflets published by this Department, a list of which will be found on the inside back cover of this issue.

The demand for the Leaflets has been steady, and in many cases the first editions were soon out of print. The opportunity was therefore taken of revising the subject matter for the second editions. Most of the second editions have been published within the past three months, and in two instances third editions have proved necessary.

Leaflets in the Agricultural and Poultry Series are issued free in Malaya. For the most part, the subject matter of the Leaflets has been drawn from more extensive articles published in Special Bulletins and *The Malayan Agricultural Journal.* The Leaflets are intended for circulation in Malaya only and applications for copies from abroad cannot be entertained.

Leave.

Mr. R. P. Davidson, Agricultural Officer, returned from leave of absence on 8th April, 1940.

Mr. G. E. Mann, M.C., Principal, School of Agriculture, has been granted 196 days leave from 25th May to 6th December, 1940, both days inclusive. Mr. V. Dawson, Vice-Principal, has assumed duty in the post of Principal from the date of the commencement of Mr. Mann's leave.

New Session at School of Agriculture, Malaya.

The 1940-41 session at the School of Agriculture, Malaya, commenced on 15th May with 72 students and pupils in residence, of which 23 were 2nd year students, 25 1st year and 24 in the One Year Course.

FERTILIZER PRICES, JUNE, 1940.

The following are the prices current for the month of June, 1940, of some of the more important fertilizers.

Product.	Analysis				Price per ton $
	Nitrogen (N)	Phosphoric Acid (P_2O_5)		Potash (K_2O)	
		Soluble	Insoluble		
Sulphate of Ammonia ...	20.6	—	—	—	114.00
Calcium Cyanamide ...	20.6	—	—	—	120.00
Muriate of Potash ...	—	—	—	60	150.00
Sulphate of Potash ...	—	—	—	48	not available
Superphosphate (concentrated) ...	—	39	—	—	140.00
Superphosphate ...	—	16-18	—	—	75.00
Basic Slag ...	—	16*	—	—	75.00
Rock Phosphate (Christmas Island) ...	—	11*	38‡	—	37.00 ¶
Rock Phosphate (very finely ground Gafsa) ...	—	11*	26 - 28‡	—	40.00
Lime ...	—	—	—	—	20.00

* Citric soluble. ‡ Total ¶ $35.00 per ton *ex* warehouse, Singapore.

Quotations are *ex* warehouse, Port Swettenham, Klang, Singapore and Penang, with the exception of muriate of potash which is *ex* warehouse, Port Swettenham, Klang and Singapore.

Statistical.

MARKET PRICES.

May, 1940.

Major Crops.

Rubber.—The month saw considerable fluctuations in price. No. 1. X. Ribbed Smoked Sheet opened in Singapore at $35\frac{3}{4}$ cents per lb. and rose steadily to $38\frac{1}{8}$ cents on the 14th; the next day the price rose steeply to $39\frac{3}{4}$ but fell steadily to $36\frac{1}{4}$ on the 24th, finally closing at $36\frac{3}{4}$ cents.

The average of daily quotations for the month was 37.22 cents per lb., as compared with 35.77 cents in April. The London average price was 11.55 pence per lb., and New York, which touched $23\frac{7}{8}$ cents gold, was 20.78 cents gold, as compared with 10.99 pence and 18.97 cents gold in April.

Prices paid for small-holders' rubber at three centres during the month are given in Table 1.

Table I.

Weekly Prices Paid by Local Dealers for Small-Holders' Rubber, May, 1940.

(Dollars per picul of 133 1/3 lbs.)

Grades	Kuala Kangsar, Perak				Kuala Pilah, Negri Sembilan				Batu Pahat, Johore.				
	1	8	15	29	2	9	16	23	1	8	15	22	2
Smoked Sheet ...	42.80	44.17	46.00	43.50	42.50	45.00	—	43.50	—	—	—	—	—
Unsmoked Sheet ...	—	—	—	—	41.50	—	44.00	—	39.50	40.93	44.43	39.80	39.
Scrap ...	—	—	—	—	—	—	—	—	—	—	—	—	—

Transport by F.M.S.R. lorry service Kuala Pilah to Seremban 12 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang $1.24 per picul, Seremban to Singapore $8 per ton.

Transport from Batu Pahat to Singapore by lorry, excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway $6.20 per ton.

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

No purchases of rubber at Kuala Kangsar on the 22nd May, and at Kuala Pilah on the 30th May.

Palm Oil.—According to *The Oil and Colour Trades Journal*, 26th April, 1940, there has been no change in the controlled prices of palm oil, which were extended to operate until the 4th May. The price (uncontrolled) of palm kernels similarly was unchanged and stood at £10.15 per ton c.i.f. It is understood that imports of palm kernels from Malaya into the United Kingdom are at present prohibited by the Food Controller.

Local sales of palm oil, in sellers' drums, were made during May at the following prices: unbleached 5 per cent. f.f.a. $188 and $195 per ton f.o.b. Port Swettenham, $185 Singapore; bleached 5 per cent. f.f.a. $200 per ton f.o.b. Port Swettenham.

Copra.—The market fell heavily in the second half of the month. The sun-dried grade continued unchanged in Singapore at $3.80 per picul during the first half of the month, but thereafter weakened steadily and closed at $3.40 per picul, averaging $3.69 as compared with $3.68 in April. The mixed grade was quoted throughout the month at 40 cents per picul lower.

It is understood that a controlled price of £12 per ton for f.m.s. Straits copra is in force in the United Kingdom.

Coconut oil was sold in Singapore during May at an average price of $9 per picul f.o.b.

Copra cake fell from $1.50 to $1.30 per picul, averaging $1.40 as compared with $1.30 in May.

Rice.—The Singapore average wholesale prices of rice per picul in May were as follows:—Thai No. 2 Ordinary $4.29, Thai No. 1 Broken (White) $3.95, Thai No. 2 Broken (White) $3.89. There were no dealings in Rangoon No. 1, Rangoon Parboiled No. 2, and Saigon No. 1 (Long Grain).

The March average retail prices per gantang (gallon) of No. 2 Thailand rice were: Singapore 29, Penang 30½, Malacca, not quoted.

The average declared trade value of imports during March was $4.61 per picul, as compared with $4.59 in February and $4.23 in January.

Padi.—The Government Rice Mills, Perak, are paying a guaranteed price of $2.50 per picul for padi, plus a bonus of 10 cents per picul for pure strain S.K. 48 padi. The Government Rice Mill, Temerloh, Pahang, paid $2.25 per picul during May.

Retail prices of padi per 100 gantangs (gallons) were as follows:— Province Wellesley and Penang $9, Perak $9.50 to $10.75, Negri Sembilan $8 to $12, ($15 to $16 Seremban and Coast), Pahang North $7 to $12, Pahang East $10 to $13, Malacca $12 to $12.80, Kelantan $10.50 to $11.50, Labuan $8 kampong, $11 to $12 towns; Brunei $10 to $15.

Pineapples.—Shipments are now commencing to the United Kingdom, but it is not yet known if the Ministry of Food will be able to purchase the whole pack. There was no change in the prices either for the canned product or for fresh fruit.

Beverages.

Tea.—No London prices are available.

The latest Colombo prices available, quoted from *The Ceylon Tea Market Report* of 28th May, 1940, of the Colombo Broker's Association are as follows, in rupee cents per lb.:—High Grown 88, Medium Grown 70, Low Grown 72.

Coffee.—Liberian coffee was quoted in Singapore throughout the month at $17.50 per picul. Excelsa fell at the close from $15.50 to $15, averaging $15.38. Robusta was quoted throughout the month at $9.50.

The average of highest and lowest quotations in Singapore for Palembang coffee was $10.20 to $12.20 per picul, and for Sourabaya coffee $13.15 to $15.30. The April average prices were $8.94 to $10.94 and $12.81 to $14.06 respectively.

Spices.

Arecanuts.—The averages of the Singapore Chamber of Commerce quotations per picul, which were stated to be approximate, were:—Best $5.25, Medium $4.79, Mixed $4.56.

The averages of the highest and lowest quotations per picul in Singapore were as follows:—Splits $3.65 to $5.15, Red Whole $3.65 to $5.20, Sliced $6.85 to $8.70, as compared with $4.25 to $5.60, $4.37 to $5.62 and $6.84 to $8.88 respectively in April.

Pepper.—Singapore Black and Muntok White were respectively quoted throughout the month at $8.25 and $14.50 per picul, as compared with April averages of $8.12 and $14.31. The market for Singapore White continued nominal with no quotations.

Nutmegs.—110's were quoted throughout the month at $28 per picul, as compared with an April average price of $27.50 per picul. 80's continued unchanged at $37 per picul.

Penang dried nutmegs were sold at $23 per picul.

Mace.—Siouw remained a nominal market with no quotations. Amboina was quoted at the close of the month at $57 per picul.

Locally produced mace, dry, was sold in Penang at $75 per picul.

Cloves.—Continued a nominal market with no quotations.

Cardamoms.—Green cardamoms were quoted in The Ceylon Chamber of *Commerce Weekly Report* of 27th May, 1940, from Rs. 1.10 to Rs. 1.40 per lb.

Miscellaneous.

Derris.—There was no change in the Singapore market for derris and prices remained as follows:—$11 to $12 for roots sold on a basis of ether extract; $21 to $23.50 for roots sold on rotenone content.

Gambier.—Cube No. 1 rose from $14 to $17 per picul, averaging $15.25 as compared with $14 in April. The market for Block remained nominal with no quotations.

Sago.—Heavy arrivals from Sarawak depressed the market for sago flour at the beginning of the month. Pearl rose from $8.50 to $9 but closed at $8.75 per picul, averaging $8.69 as compared with $8.75 in April. Flour, Sarawak Fair, opened at $5.75, rose to $6.25 and closed at $6, averaging $6, as compared with $6.01 in April.

Tapioca.—Flake Fair was quoted throughout the month at $9 per picul. Seed Pearl fell from $10 to $9.50, averaging $9.62, and Medium Pearl fell from $10.50 to $9.50, averaging $9.75. The April averages were $9.25, $10.25 and $10.75 respectively.

Tobacco.—Prices of prepared tobacco per picul in Kelantan during May were: 1st quality $100 to $160, 2nd quality $70 to $128, 3rd quality $40 to $112. In Perak Central the three grades of cured leaf were $34, $25.50 and $19 respectively, and for prepared tobacco $60, $38 and $30. In Perak South cured leaf was $40, $35 and $30, and 70 cents per kati for cut tobacco. In Penang and Province Wellesley dried leaf was $39 1st grade, and $29 2nd grade. In Negri Sembilan the range was $20 to $28, $15 to $20 ($18 to $25 Jelebu), $10 to $18; in Pahang North $25 to $36, $15 to $27, $10 to $21; in Pahang South $25 to $40 and $56 to $96 for cut tobacco. In Malacca dried leaf was $37.

The above prices are based on London and Singapore daily quotations for rubber, on the Singapore daily prices for copra, on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports and certain coffee prices are kindly supplied by Guthrie & Co., Ltd., Kuala Lumpur, local palm oil prices by Whittall & Co., Kuala Lumpur, the Singapore prices of imported coffee and arecanuts by Lianqui Trading Company of Singapore, and Singapore derris prices by Hooglandt & Co., Singapore.

1 picul = 133 1/3 lbs. The dollar is fixed at 2s. 4d.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Trafalgar Square, London, W.C.2.

MALAYAN AGRICULTURAL EXPORTS, MARCH, 1940.

Product	Net Exports in Tons				
	Year 1939	Jan./Mar. 1939	Jan./Mar. 1940	March 1939	March 1940
Arecanuts ...	38,489	10,588	11,888	2,731	3,780
Coconuts fresh†‡ ...	97,275†	24,862†	19,803†	9,136†	8,558†
Coconut oil‡ ...	61,360	12,993	15,759	4,361	6,136
Copra‡ ...	34,420	3,707	4,371*	2,612	3,123*
Copra cake ...	10,707	1,853	3,154	949	772
Gambier, all kinds ...	1,572	618	313	195	210
Palm kernels ...	10,774	2,824	2,106	816	790
Palm oil ...	59,712	12,078	12,007	5,459	5,402
Pineapples, canned ...	65,802	10,101	12,651	5,924	3,036
Rubber¶ ...	361,484¶	78,762¶	125,476¶	21,214¶	31,830¶
Sago,—flour ...	9,583	2,316	245	456	1,430
,, —pearl ...	3,883	796	933	360	207
,, —raw ...	4,435*	888*	1,464*	362*	582*
Tapioca,—flake ...	1,068	252	275	142	67
,, —flour ...	2,706*	854*	409*	496*	161*
,, —pearl ...	18,277	3,583	2,947	1,301	1,560
Derris ...	1,356	358	370	154	104
‡Copra equivalent ...	136,075	25,318	21,978	9,882	7,019

† hundreds in number. * net imports. ¶ production.

MALAYAN PRODUCTION OF PALM OIL AND KERNELS

(In long tons, as declared by Estates).

Month 1940	Palm Oil			Palm Kernels		
	F.M.S.	U.M.S.	Malaya	F.M.S.	U.M.S.	Malaya
January ...	2,007.6	2,474.0	4,481.6	434.3	497.0	931.3
February ...	1,937.9	1,914.7	3,852.6	411.1	454.0	865.1
March ...	2,081.5	1,895.6	3,977.1	445.3	388.1	833.4
April ...	2,104.3	1,820.7	3,925.0	420.8	370.0	790.8
Total ...	8,131.3	8,105.0	16,236.3	1,711.5	1,709.1	3,420.6
Total January to April, 1939 ...	9,209.5	8,826.6	18,036.1	1,663.9	1,524.0	3,187.9
Total for the year 1939 ...	30,157.7	27,215.0	57,372.7	5,639.3	4,533.1	10,172.4

Stocks on estates as at 30th April, 1940, were: palm oil 4,095 tons, palm kernels 1,148 tons.

MAJOR AND MINOR CROPS CULTIVATED IN MALAYA, 1939.

(acres)

State	Rubber	Other Major Crops	Minor Crops					Total
			Beverages	Food Crops	Fruits	Spices	Miscellaneous	
Perak ...	584,399	235,124	1,614	14,507	33,480	4,262	7,602	880,988
Selangor ...	507,583	150,180	9,587	8,765	7,572	818	5,511	690,016
Negri Sembilan ...	396,065	44,093	1,015	4,226	6,671	52	778	452,900
Pahang ...	200,672	58,112	4,958	7,368	11,026	2,021	13,097	297,254
Total F.M.S. ...	1,688,719	487,509	17,174	34,866	58,749	7,153	26,988	2,321,158
Singapore Island ...	52,805	10,198	—	4,300	3,300	386	210	71,199
Malacca ...	199,943	45,602	642	5,033	3,544	855	1,621	257,240
Province Wellesley ...	68,946	70,506	—	1,474	1,106	982	1,717	144,731
Penang ...	18,085	13,007	6	677	2,936	1,487	318	36,517
Labuan ...	1,908	6,600	—	2,304	—	—	—	10,812
Total S.S. ...	341,688	145,913	648	13,788	10,886	3,710	3,866	520,499
Johore ...	941,129	267,701	7,832	17,183	16,741	38,795	7,592	1,296,973
Kedah ...	313,019	289,037	1,856	8,467	11,259	6,735	5,655	636,028
Kelantan ...	94,276	204,322	51	11,661	7,044	5,637	3,253	326,244
Trengganu* ...	43,503	65,234	17	2,050	6,139	6,744	1,941	125,628
Perlis ...	5,345	43,317	26	768	1,693	2,098	584	53,831
Brunei ...	14,970	7,631	28	2,999	337	181	—	26,146
Total U.M.S. ...	1,412,242	877,242	9,810	43,128	43,213	60,190	19,025	2,464,850
Total Malaya 1939 ...	3,422,649	1,510,664	27,632	91,782	112,848	71,053	49,879	5,306,507
Total Malaya 1938† ...	3,281,900	1,478,235	29,081	60,130	103,396	68,470	52,953	5,074,165

* Excluding Southern District except in the case of rubber and coconuts.
† Excluding Brunei.

Notes:—*Major Crops*—Padi, coconuts, pineapples, oil palm.
Minor Crops—Beverages:—Coffee, tea.
Food Crops:— Tapioca, sweet potato, sago, sugar cane, groundnuts, vegetables, yams, maize, market gardens, colocasia.
Fruits:—Bananas, specified fruits, mixed fruits, papaya, cashew nuts.
Spices:—Arecanuts, chillies, pepper, cardamoms, ginger, sireh, nutmegs, cloves, turmeric.
Miscellaneous:—Tobacco, derris, nipah, gambier, kapok, cinchona, tung oil, grasses, patchouli, citronella, gutta percha, gingelly, soya beans, miscellaneous.

ACREAGES OF TAPPABLE RUBBER ACTUALLY TAPPED AND NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 30TH APRIL, 1940.

STATE OR TERRITORY	Estimated Acreages of Tappable Rubber (9)+(11)	ACREAGES OF TAPPABLE RUBBER NOT TAPPED				Area of tappable rubber never been tapped (b)		Total area not tapped (3)+(5) (c)		TOTAL AREA TAPPED DURING THE MONTH		Area of tappable rubber rested under rotational systems (c)	
		On estates which have entirely ceased tapping		On estates which have partly ceased tapping (a)									
		Acreage	Percentage of (3) to (2)	Acreage	Percentage of (5) to (2)	Acreage	Percentage of (7) to (2)	Acreage	Percentage of (9) to (2)	Average	Percentage of (11) to (2)	Acreage	Percentage of (13) to (2)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
S.S.—													
Province Wellesley ...	42,752	453	1.1	9,977	23.3	454	1.1	10,430	24.4	32,322	75.6	7,970	18.6
Malacca ...	116,123	2,228	1.9	19,292	16.6	1,409	1.2	21,520	18.5	94,603	81.5	24,500	21.1
Penang ...	2,601	63	2.4	804	30.9	35	1.3	867	33.3	1,734	66.7	60	2.3
Singapore ...	31,574	5,639	17.9	5,948	18.8	241	0.8	11,587	36.7	19,987	63.3	2,933	9.3
Total S.S. ...	193,050	8,383	4.3	36,021	18.7	2,139	1.1	44,404	23.0	148,646	77.0	35,463	18.4
F.M.S.—													
Perak ...	281,479	5,879	2.1	38,548	13.7	6,559	2.3	44,427	15.8	237,052	84.2	41,459	14.7
Selangor ...	312,129	3,782	1.2	34,442	11.0	4,465	1.4	38,224	12.2	273,905	87.8	47,906	15.3
Negri Sembilan ...	257,273	7,242	2.8	43,776	17.0	8,478	3.3	51,018	19.8	206,255	80.2	34,301	13.3
Pahang ...	85,409	1,441	1.7	13,955	16.3	3,781	4.4	15,396	18.0	70,013	82.0	8,069	9.4
Total F.M.S. ...	936,290	18,344	1.9	130,721	14.0	23,283	2.5	149,065	15.9	787,225	84.1	131,735	14.1
U.M.S.—													
Johore ...	474,745	8,315	1.7	84,497	17.8	29,724	6.3	92,812	19.5	381,933	80.5	57,686	12.2
Kedah ...	196,234	6,928	3.5	16,879	8.6	6,016	3.1	23,807	12.1	172,427	87.9	37,700	19.2
Kelantan ...	31,162	403	1.3	4,998	16.0	1,441	4.6	5,401	17.3	25,761	82.7	5,551	17.8
Trengganu (d) ...	4,817	nil	nil	40	0.8	nil	nil	40	0.8	4,777	99.2	1,622	33.7
Perlis (e) ...	1,450	126	8.7	434	29.9	132	9.1	560	38.6	890	61.4	154	10.6
Brunei ...	5,929	nil	nil	1,656	27.9	270	4.6	1,656	27.9	4,273	72.1	1,078	18.2
Total U.M.S. ...	714,337	15,772	2.2	108,504	15.2	37,583	5.3	124,276	17.4	590,061	82.6	103,791	14.5
Total MALAYA ...	1,843,677	42,499	2.3	275,246	14.9	63,005	3.4	317,745	17.2	1,525,932	82.8	270,989	14.7

Notes.—(*a*) Area out-of-tapping on estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping round.

(*b*) The acreage shown in column (7) is included in columns (3) and (5).

(*c*) Areas of tappable rubber rested under rotational systems are not considered as out-of-tapping and therefore columns (11) and (12) include columns (13) and (14) respectively.

ACREAGE, STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX.
FOR THE MONTH OF APRIL, 1940, IN DRY TONS

State or Territory	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month			Consumption 3	
								during the month		January to April 1940		during the month		January to April 1940						
	Ports	Dealers	Estates of 100 acres and over	during the month	Jan. to April 1940	during the month	Jan. to April 1940	Foreign	From Malay States & Labuan	Foreign	From Malay States & Labuan	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over	during the month	Jan. to April 1940
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
MALAY STATES :—																				
Federated Malay States ...	...	3,443	22,725	12,392	53,208	12,933	35,570	Nil	Nil	Nil	Nil	11,168	13,272	56,830	34,999	...	6,549	20,462	42	112
Johore ...	...	1,083	8,796	5,752	24,521	7,143	21,580	Nil	73	Nil	335	2,348	9,986	13,682	33,231	...	2,565	7,948	...	...
Kedah ...	...	218	4,792	3,256	12,945	2,351	5,713	Nil	Nil	Nil	Nil	1,532	4,033	7,489	12,920	...	442	4,610	...	...
Perlis ...	...	16	54	16	66	37	130	Nil	Nil	Nil	Nil	Nil	53	Nil	190	...	35	35	...	...
Kelantan ...	...	344	759	332	1,543	1,122	3,895	Nil	Nil	Nil	Nil	118	1,542	607	4,946	...	209	679	...	...
Trengganu ...	...	Nil	296	165	731	424	1,443	Nil	Nil	Nil	Nil	5	625	5	2,232	...	58	197	...	...
Brunei ...	...	Nil	86	52	252	70	359	...	...	...	...	...	130	...	613	...	6	72	...	...
Total Malay States	...	5,104	37,499	21,965	93,266	24,080	68,690	Nil	73	Nil	335	15,171	29,641	78,613	89,131	...	9,864	34,003	42	112
S. SETTLEMENTS :—																				
Malacca ...	...	1,557	2,111	1,168	4,955	1,038	3,459	Nil		Nil		1,579		10,476		...	2,055	1,746	...	...
Province Wellesley	...	630	967	479	1,913	289	1,045	Nil		Nil		6,579		33,960		...	1,817	834	...	...
Penang ...	571	2,583	11	22	82	116	462	1,487	23,821	10,639	80,414		Nil		Nil	2,954	3,568	18	...	...
Singapore ...	5,689	15,031	281	160	663	83	295	20,562		75,556						10,701	25,016	285	20	68
Labuan ...	...	20	Nil	Nil	Nil	13	59	57		225		24,101		107,969		...	34	Nil	...	...
Total Straits Settlements ...	6,260	19,821	3,370	1,829	7,613	1,539	5,320	22,106	23,821	86,410	80,414	32,259	Nil	152,405	Nil	13,655	32,490	2,883	20	68
Total Malaya ...	6,260	24,925	40,869	23,794	100,879	25,619	74,010	22,106	23,894	86,410	80,749	47,430	29,641	231,018	89,131	13,655	42,354	36,886	62	180

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province We'sly D'dings M'cca.	Johore	Kedah
22	23	24	25	26	27	28
DRY RUBBER	5,729	23,931	3,440	3,440	1,976	238
WET RUBBER	820	1,085	128	472	589	204
TOTAL ...	6,549	25,016	3,568	3,912	2,565	442

TABLE III
FOREIGN EXPORTS

PORTS	For month	Jan. to April 1940
29	30	31
Singapore ...	34,141	164,647
Penang ...	8,844	44,835
Port Swettenham.	4,080	20,627
Malacca ...	365	909
MALAYA ...	47,430	231,018

TABLE IV
DOMESTIC EXPORTS 4

AREA	For month	Jan. to April 1940
32	33	34
Malay States ...	44,722	167,256
Straits Settlements	3,452	13,084
MALAYA ...	48,174	180,340

Notes:—

1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained
2. The production of estates of less than 100 acres is estimated from the formula: Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month. + Consumption, *i.e.*, Column [7] = Columns [13] + [14] + [17] + [18] + [19] + [20] − [2] − [3] − [4] − [5] − [9] − [10]. For the Straits Settlements the production of estates of less than 100 acres is represented by sales or exports as shown by cess paid.
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.
4. Columns (33) and (34) represent exports of rubber subject to regulation which, for Singapore and Penang Islands are represented by sales or exports as shown by cess paid.
5. All statements are brought up to date monthly, and any inaccuracies that may be disclosed are corrected in the totals; the latest publication therefore, is always the most reliable.
6. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S and F.M.S., at Singapore on 25th May, 1940

METEOROLOGICAL SUMMARY, MALAYA, APRIL, 1940.

Locality.	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine.		
	Means of			Absolute Extremes						Total.		Most in a day.	Number of days.					Total.	Daily Mean.	Per cent.
	A. Max.	B. Min.	Mean of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot	At 4 feet			Amt.	Precipitation .01 in or more	Precipitation, .04 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more			
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.						hrs.	hrs.	
Kuala Lumpur Aerodrome Selangor ...	92.7	74.5	83.6	95	72	88	77	85.7	86.8	9.61	244.1	2.08	21	20	6	6	—	207.25	6.91	57
Port Swettenham Aerodrome, Selangor ...	91.5	73.4	82.5	94	71	85	76	88.2	87.5	3.58	90.9	0.54	16	14	1	—	—	225.15	7.51	61
Sitiawan, Perak ...	90.3	74.7	82.5	93	72	88	77	84.7	85.2	9.94	252.5	4.51	15	13	5	—	—	239.00	7.97	65
Ipoh Aerodrome, Perak ...	92.2	74.1	83.1	95	71	89	77	85.3	85.8	8.10	205.7	2.06	17	14	7	—	—	233.00	7.77	64
Temerloh, Pahang ...	94.3	73.3	83.8	97	71	87	76	88.1	88.0	6.15	156.2	1.92	14	12	1	7	—	223.95	7.47	61
Kuala Lipis, Pahang ...	93.3	73.3	83.3	96	70	85	76	87.3	86.8	4.56	115.8	1.02	18	13	3	19	—	231.75	7.73	63
Kuala Pahang, Pahang ...	88.0	75.9	81.9	91	73	80	79	89.0	89.2	6.98	177.3	1.78	13	10	1	—	1	262.90	8.76	72
Kallang Aerodrome, S'pore ...	87.9	76.3	82.1	93	74	81	80	83.8	84.5	6.07	154.2	1.43	13	13	5	—	—	190.05	6.33	52
Bayan Lepas Aerodrome Penang ...	89.9	75.6	82.7	93	73	87	78	87.9	88.0	5.03	127.8	1.60	17	14	3	—	—	249.20	8.31	68
Malacca Town, Malacca ...	88.3	75.0	81.7	93	73	84	78	87.7	88.3	6.76	171.7	1.29	16	11	2	—	2	233.95	7.80	64
Kluang, Johore ...	91.8	71.6	81.7	94	70	86	75	83.6	83.7	3.81	96.8	0.90	19	16	9	8	—	200.85	6.69	55
Mersing, Johore ...	89.7	73.4	81.5	93	71	81	75	85.8	84.5	3.95	100.3	1.05	12	11	—	—	—	242.55	8.09	66
Alor Star, Kedah ...	94.4	73.8	84.1	98	71	90	77	88.0	89.2	8.07	205.0	2.03	16	14	7	2	2	255.85	8.53	70
Kota Bahru, Kelantan ...	93.7	73.7	83.7	96	69	91	76	86.5	85.1	2.33	59.2	2.22	3	3	—	—	—	287.35	9.58	79
Kuala Trengganu, Trengganu	†84.0	70.5	77.3	86	66	79	75	81.4	82.9	3.79	96.3	2.32	9	8	—	3	—	242.42	8.36	70
	‡87.8	71.1	79.5	90	68	83	74	*	*	0.70	17.8	0.35	5	3	1	3	—	300.11	9.68	80
	¶90.6	73.3	81.9	92	70	89	76	*	*	2.13	54.1	0.92	8	8	1	—	—	283.00	9.43	77
Labuan ...	87.7	77.4	82.5	90	74	86	80	88.3	88.5	8.17	207.5	2.55	12	10	2	—	—	252.10	8.40	69
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft.	76.1	64.1	70.1	79	63	73	65	74.2	73.8	5.95	151.1	1.47	17	13	1	13	—	184.75	6.16	50
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	74.9	55.8	65.3	78	49	71	62	70.5	69.5	7.94	201.7	2.03	20	15	—	3	—	171.95	5.73	47
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft. ...	74.5	61.0	67.7	78	59	70	63	*	*	7.05	179.1	1.67	18	14	—	—	—	197.05	6.57	54